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AN INTRODUCTION TO
THE PSYCHOLOGICAL
PROBLEMS OF INDUSTRY

BY THE SAME AUTHOR

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AN INTRODUCTION TO THE PSYCHOLOGICAL PROBLEMS *of* INDUSTRY

BY

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TO
C. S. MYERS, M.A., M.D., F.R.S.
THE FOUNDER OF THE *INSTITUTE OF APPLIED*
PHYSIOLOGY AND PSYCHOLOGY IN WHICH
THE INTENSIVE STUDY OF MANY
OF THE PROBLEMS DEALT
WITH IN THESE PAGES
IS PROPOSED

PREFACE

AN increasing number of persons—works managers, politicians, trade unionists, welfare-workers and students—has become deeply interested in industrial psychology. In this book the author has attempted to bring together and develop much that may legitimately be discussed under that heading. No one will deny the difficulty of treating this subject in a dispassionate manner, but every endeavour has been made to deal with the more vexed questions in as impartial a spirit as is humanly possible. If the attempt has not been successful, then it can at least be claimed that the path has been made easier for my successor. What is not claimed, however, is that this present work is more than an introduction to an admittedly complex subject : the time is hardly ripe for a complete text-book in industrial psychology.

I should like here to express my sense of indebtedness to Prof. T. H. Pear for reading through the proofs of these pages, and for making many valuable suggestions which have enabled me to improve the text considerably.

F. W.

CONTENTS

CHAPTER I

	PAGE
THE PSYCHOLOGICAL POINT OF VIEW IN INDUSTRY	11

CHAPTER II

INDUSTRIAL FATIGUE AND INEFFICIENCY	21
§ 1. MUSCULAR FATIGUE	21
§ 2. ORGANIC VARIABILITY	33
§ 3. MENTAL FATIGUE	40

CHAPTER III

THE ELIMINATION OF FATIGUE FROM WORK BY MOTION STUDY	50
§ 1. THE WORK OF MR. F. B. GILBRETH	50
§ 2. THE TECHNIQUE OF MOTION STUDY	61

CHAPTER IV

VOCATIONAL SELECTION	67
§ 1. THE NEED FOR SYSTEMATIZED SELECTION	67
§ 2. THE EVOLUTION OF OCCUPATIONAL APTITUDES	71
§ 3. INTELLIGENCE TESTS	76
§ 4. VOCATIONAL PSYCHOLOGY	90

CHAPTER V

SCIENTIFIC MANAGEMENT AND LABOUR	98
§ 1. TAYLORISM : FIRST PHASE	98
§ 2. TAYLORISM : LATER PHASES	110
§ 3. THE PSYCHOLOGY OF REPETITION WORK	115
§ 4. THE LABOUR ATTITUDE TO SCIENTIFIC MANAGEMENT	128

10 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

CHAPTER VI

	PAGE
INDUSTRIAL UNREST . . . . .	. 137
§ 1. CLASS CONSCIOUSNESS . . . . .	. 137
§ 2. THE SPRINGS OF CONDUCT . . . . .	. 153
§ 3. GREGARIOUSNESS AND GROUP LIFE . . . . .	. 160
§ 4. THE INSTINCTS IN INDUSTRY . . . . .	. 174
§ 5. THE WOMAN WORKER . . . . .	. 187

CHAPTER VII

THE CREATIVE IMPULSE IN INDUSTRY. . . . .	. 191
§ 1. THE DECLINE OF THE TRADITIONAL TYPES OF CRAFTSMANSHIP . . . . .	. 191
§ 2. MODERN RECREATION . . . . .	. 200
§ 3. IDEALS IN INDUSTRY . . . . .	. 207
§ 4. CO-PARTNERSHIP . . . . .	. 210
§ 5. STATE SOCIALISM . . . . .	. 215
§ 6. SYNDICALISM . . . . .	. 217
§ 7. INDUSTRIAL DEMOCRACY . . . . .	. 219
§ 8. INDUSTRIAL EDUCATION . . . . .	. 225

CHAPTER VIII

CONCLUSION . . . . .	. 233
INDEX . . . . .	. 239

An Introduction to the Psychological Problems of Industry

CHAPTER I

THE PSYCHOLOGICAL POINT OF VIEW IN INDUSTRY

Two sets of problems confront our industrial leaders to-day, one set technical and centred in the economic management of materials, the other set physiological and psychological and centred in the effective organization of labour. This little book deals mainly with the psychological problems of industry, the solution of which will help to consolidate that working partnership between science and industry we all desire. We do not mean to suggest that the psychologist can successfully attack industrial problems without special training, but it will be agreed that he ought to be able in his own way to supplement on the human side what has been so extraordinarily well done on the material side to increase the efficiency of our industrial system.

What is Psychology? The boundaries of a new science are usually difficult to trace, and never so sharply defined that a plain answer to our question can be hoped for. Yet at the outset in the study of every science the obviously proper thing to do is to get an adequate idea of the science as a whole, of the extent of its general reference, of the nature of the phenomena which it attempts to describe and explain, and of its relation to other closely

12 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

allied sciences. In many cases, unfortunately, the exact meaning and reference of a science are the last rather than the first things about which we can be certain. Still, the preliminary ordeal which must be successfully passed through before any science can establish its claim to autonomy lies in showing beyond cavil that it supplies a felt want, and that what it claims as its subject matter is not being dealt with satisfactorily by another science.

Most of us have the distinct feeling that the science of psychology should illuminate for us, as no other subject can, the essential quality and structure of the human mind as it is to be observed in action and in repose—how it normally develops, and what conditions are favourable or unfavourable to this development, how its machinery works in detail, what sort of thing causes it to break down occasionally, and how it may be set in effective operation again after it has broken down. This more or less vague idea of the scope of psychology might well serve as a compass in our attempt to map out the bearings of those problems of modern industry which profoundly affect, as thinking and feeling beings, the workers in its service.

We shall probably find, however, that much of man's behaviour cannot be explained except by reference to tendencies which are not exclusively human, since we share them with the lower animals both in quality and strength. This means that there is an animal psychology as well as a human psychology ; animals, that is to say, are creatures of impulse and habit that may well be considered to experience sensations and feelings just as we do. Thus psychology is sometimes spoken of comprehensively as the natural science of the behaviour of living creatures. This is a good provisional definition, since it covers both human and animal activity. But men and animals are also mechanisms of marvellous contrivance, so that psychology may be described, still more comprehensively, as the science which deals with the behaviour of man, con-

sidered not only as a human being but also as an organism, and not only as a human being and as an organism, but also as the mechanism of his self-expression. Moreover, psychology will deal with the *group-life* of men and the conditions of its existence and unity. The various schemes for the organization of industry as a *group-adventure* must, therefore, call for psychological study.

There are still, however, a few persons, though their number is rapidly diminishing, who confess themselves to be extremely sceptical about the possibility of establishing a science which will completely explain even the simplest activities of any living creature endowed with spontaneity and resourcefulness. They will tell you that our sensations and feelings and thoughts, and consequently our actions, are so incalculable, our motives so inscrutable, our ambitions so difficult to unravel and the roots of our interests so past searching out, that an exact science of human experience will always be impossible. But whether yet *completely* scientific or not, psychology has so decisively shown its practical utility to the educator in search of teaching method, to the doctor interested in mental hygiene, to the lawyer trying to estimate the value of evidence, to the advertiser seeking publicity, to the business man anxious to inspire confidence, and to the nation desirous of sustaining its *morale*, that we need not blush for its supposed present frailty. If we are told that it is not yet a science with a reputation as sound as that of the physical sciences, let us remember that we have hardly yet entered the epoch of experiment

In many instances this attitude of scepticism about the practical possibilities of psychology to which we have referred is easily explained. It has resulted from the fact that the psychologist in consciously constructing his new *science*, and in the face of immediate difficulties, may perhaps have occasionally thrown aside whatever unconscious psychological *art* he possessed, in order to be freer for grappling with his problems. Thus some critics

14 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

have pointed the finger of scorn at the weird and wonderful subtleties of mathematical structure which are usually erected upon the comparatively unsubstantial data brought together after an investigation into such a problem, let us say, as that connected with the interrelations of the various abilities of school children. Such elaborate structures frequently are but shells covering the most trivial truths, and the unbeliever asks whether they are really worth the time and energy spent upon them. We should all agree that as a substitute for insight and intuition such investigations are certainly *not* worth while, that nothing is to be gained in the end by saying a plain thing in a roundabout manner or by befogging it with technicalities and statistics. Nevertheless, mathematical methods provide an excellent complement to observation, serving to test and refine it (and capable of being themselves refined by it in their turn).

So that while it may be true to say that in some cases—surely not so many—the more mathematical the method of a psychologist has become the less subtle and delicate has been his art, it cannot seriously be argued that a psychologist who still retains his insight will not be the better equipped through the possession in certain directions of methods of precise mental measurement. Indeed, it is just this possibility of using measurement in dealing with human problems in industry that has made the possibility of establishing industrial psychology as a definite science so fascinating.

Another reason why the professional psychologist is esteemed lightly by his contemporaries is that he is too frequently unwilling to quit the enclosures of a narrow specialism and adventure into the fields of public controversy, there to pass judgment in his own way on current tendencies in art, religion, industry and politics, and to say quite frankly how the various proposals for the solution of our common problems strike him from the psychological standpoint. It is suspected that the specialist in mental reactions who has nothing vital to say concerning the

probable effects of new methods of political, industrial and religious re-organization and reconstruction upon the minds of men and women is out of touch with his time. This misconception needs to be cleared away, and the specialist should be encouraged as a matter of common routine to come out into the open and apply his expert knowledge to everyday matters.

In the great world war America made far greater use of her psychologists than we did. She realized very early the need of conserving her human resources and of placing every man in the position where his abilities would find fullest scope and most economical use. This was done largely by psychological examinations. Fortunately, America had the leisure for scientific preparation, and was not obliged, as we ourselves were, in the early days of the war, to use up extravagantly as privates in the ranks better human material than was in many cases available towards the end for highly specialized tasks. Too often we acted, it must seem now to the cool observer, as though one man was as good as another for any kind of task that might turn up. It was as though we had decided in the face of difficulty, unprepared as we were, that one weapon was as good as another for no matter what purpose, and so used razors for opening packing cases, and mahogany for lighting fires. We shall deal briefly with the work of the American psychologists in selecting the best fitted men for specific tasks ; for example, as officers, N.C.Os., and expert workers in the technical services. It has been well known for some time that this work was a success. Now, it will be an increasingly important branch of the psychologist's work in peace as well as in war, in an ordered society, to help to select scientifically the right men for particular forms of employment, and this work is already being done.

It should be stated clearly at once that the industrial psychologist, though concerned with the discovery among other things of the best possible conditions for securing the efficiency of the worker, and though as an ordinary

man among other men bound to attach values to what he sees about him, is not concerned *as a psychologist* with the rightness or wrongness of the purpose for which modern industry is undertaken, that is, with any *ethical* problem as such. It is not his business as a scientist to take sides either with the employer against the workman, or with the workman against the employer. But bad workmen, bad employers, and bad methods will interest him as much as good workmen, good employers, and good methods. In considering the relation to human efficiency of monotony and variety of occupation, of the speed and noise of machinery, of piecework, daywork and overtime, of fatigue and rest, or irritation or good-will, and of the other manifold factors affecting the worker which demand his attention, his *aim*, then, must be *scientific*: to collect the facts, to arrange them, and to attempt to explain them. So that the antagonisms of employers and workers will provide him not with the subject for a sermon, but with data for the construction of his conclusions about human nature as it functions at present in industry or may be expected to function in improved conditions. If his conclusions are sometimes put to base uses it is not his fault. To attack the psychologist, therefore, because some of the results of his researches may be ignobly exploited in the service of mean ends and to the great disadvantage of the workers or the community, or both, is as stupid as to advocate the abolition of the physical sciences because they were so universally employed during the recent war in furthering the destruction of life.

The psychologist is deeply interested in what is called scientific management, though not everything that has been done in the name of scientific management can be psychologically justified. Indeed, had the psychologist or the man in the street been consulted, he could probably have predicted many of the conflicts which have arisen between so-called efficiency experts and organized labour. Excellent as their work was from

one point of view, it was folly to ignore, as many of the early efficiency experts did, the sentiments of the manual worker. In this connection, however, we may note the gathering strength to-day of the general desire among both employers and employed for the reversal of the tendency which the early scientific management apostles undoubtedly accelerated, that tendency which was making it increasingly necessary for the workers to adapt themselves both mentally and physically to the demands of the machinery they were called on to operate or feed. When this reversal has been carried through to the extent that machines have been modified to fit men instead of men modified to fit machines, we shall be able to plan the work of a factory so that, not only will there be no initial human waste involved in putting men on jobs unsuited to their ability, but there will also be a natural and economical passage of human ability through the various shops, each movement or promotion calling for greater skill, intelligence, and responsibility on the part of the worker, with each new task providing a greater and more enduring satisfaction than the old one. Taylor and his disciples have shown us how to plan economically the route of the materials of manufacture through the workshops : it is for the industrial psychologist to attempt in the coming years, with the support and encouragement of management, what has never yet been seriously attempted, this economical route-ing of human ability so that every process on which a worker finds himself engaged shall be the natural basis of apprenticeship for proficiency in the process which follows. There has been, and of course must always be, a natural sequence of *processes* : there must also be a natural sequence of *tasks*. Economy suggests it ; humanity demands it. In no other way shall we be able to keep the sources of life permanently clean and wholesome.

Were it necessary to enforce our point we could instance cases where girls from school begin work on a job which calls for the display of a certain degree of finger dexterity.

18 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

When they have grown bigger—and for no other reason—they will be transferred to other jobs too simple for grown women, yet involving considerable stretching, lifting or carrying. Then later the same girls will be once again moved on to work demanding at a higher degree of development that same type of skill which they were already gathering in the first process, but have since practically lost. The soundest economy would seem to call in such cases for the modification of a process or machine which interferes with the continuity of the development of the worker in skill, intelligence and responsibility. In industry as well as in education, then, we need an open “highway,” so that the private in the industrial army may once again feel that he can hope one day to use the field-marshal’s baton which he may have in his knapsack. But the problem of constructing such highways is by no means simple.

Yet it is because of the growing significance of problems of this kind, which are constantly arising, that industrial psychology has become so vitally interesting; and these problems will not diminish in number as the years pass. The technicians of industry themselves realize this truth. In fact, as Mr. A. P. M. Fleming said to his fellow engineers in an address at Manchester some time ago:—

I have no hesitation in suggesting that the most important of all the problems with which we have to deal, and one which will be of increasing importance in future, concerns the human element in industry.¹

We have suggested that the early efficiency engineers of America paid insufficient attention to this element. Such is our English reputation for common sense that we have never lacked leaders who have sought to demonstrate its importance and emphasize the unwisdom of neglecting it. Thus, Robert Owen was gravely concerned about it

¹ Chairman’s address, Institution of Electrical Engineers, N.W. Section, November, 1918.

soon after the arrival of the Industrial Revolution, and sixty years ago, John Ruskin, to quote another shining example, sounded a still-echoing note in *Unto this Last* in favour of the scientific study of the human aspects of economics and industry. But the prevailing scientific interests of his time were materialistic, and industrial psychology (the study of human nature in industry) was impossible as a science so long as nature was regarded by the scientists of the school of Huxley and Tyndall merely as a vast machine, wonderfully intricate in all its mutually dependent parts, and while labour was organized on the principle that man himself might safely be treated as a mechanical unit and as little or nothing more.

From a consideration of such facts as the foregoing it will be apparent that we may follow either one or both of two lines of inquiry in our endeavour to trace the causes of our industrial inefficiency and unrest and discover the conditions favourable to a full working power. We may study, on the one hand, the direct effects of modern methods and conditions of work upon the worker, or we may, on the other hand, seek to understand the nature of the relationships which will normally be established among men and women wherever they participate together in the adventure of large scale industry. The first line of inquiry has already been worked out in considerable detail, so that in pursuing it we shall be covering much well-known ground. Here, then, our method must be largely historical, and apology is due to those readers who are already familiar with the main features of the road. If, however, such an inquiry fails in the end—as we believe it will fail—to provide us with a *complete* solution of our problems, then the second course will become imperative as an indispensable complementary method of procedure. To the study, then, of the direct effects of labour on the worker viewed as an individual apart from his social setting we must first apply ourselves.

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CHAPTER II

INDUSTRIAL FATIGUE AND INEFFICIENCY¹

§ 1. MUSCULAR FATIGUE

It has frequently been stated that *fatigue* is at the bottom of most of the industrial unrest from which we suffer to-day. Consequently the actual demonstration by the American efficiency engineers of the possibility of substantially decreasing the amount of fatigue suffered daily by the workers in the various branches of industry has naturally aroused within the past three decades a widespread interest in the search for the best methods of eliminating superfluous exertion and anxiety during labour. In Britain we have concentrated by general consent upon the elimination of fatigue from industry as the chief method of increasing our working efficiency. Physiologists and psychologists have sought in consequence, to penetrate more deeply into an understanding of the nature and causation of fatigue with a view to combating it in scientific fashion. But whether, indeed, the attempt to eliminate fatigue from work will prove the full solution of our industrial ills or not, it is an attempt which must, at least, be productive of some good and, therefore, needs to be made.

¹ It must be obvious that in the discussion of the subjects dealt with in this chapter and the next, certain almost hackneyed illustrations could not be omitted except at the risk of the reader losing his historical perspective of the subject. He may, however, find the working classification of the forms of fatigue a fresh contribution to the problems treated.

22 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

What is fatigue? To begin with a definition does not at all mean that we are familiar with the real nature of the thing defined, but it is, nevertheless, to have a guiding thread to help us when faced with a tangle of obscurities. Though there is still a large measure of uncertainty and diversity of opinion about the nature of fatigue, some of the more prevalent errors may be avoided by a little preliminary thought. To say, for example, that fatigue is the condition which results from the accumulation of the waste products of activity in the muscles is to be led to take too mechanical a view of its causation, and to hold that it is a condition of lowered capacity *of the organism* for effort is to be tempted to envisage the phenomenon as wholly physiological, and neglect the *will-to-work* which should figure prominently in every study of the human factor in industry. But simply to define fatigue broadly as a condition of lowered capacity for work,¹ is to avoid the acceptance of nothing but those purely mechanical and physiological views, and to leave open for the time being the question of causation.

It is obviously possible that there may be a fatigue in the muscular system, an inefficiency in the organic forces concerned in the co-ordination and adjustment of the nervous and glandular systems, and in addition a fatigue of the enlightened will. How are these different forms of inefficiency related to one another? Can we measure them either as separable or as a unity?

Let us see first what results from a view of man as a mechanical structure set in operation by the contractions and relaxations of the muscles. Muscular effort cannot, of course, be continued indefinitely. This is partly because of the gradual accumulation, already mentioned, of the waste products of physical activity which "clog the

¹ Dr. W. H. R. Rivers defines fatigue as "a condition of lowered capacity for work which follows or occurs during the performance of work of which it is the direct result." (*The Influence of Alcohol and other Drugs upon Fatigue.*)

mechanism," and partly because the total store of energy in the muscles becomes steadily depleted during continued effort. Now, it has been found possible to wash out the waste products from the muscles with a saline solution or to neutralize them chemically, but normally the muscles are kept clear of waste material by the irrigating action of the blood, which, moreover, restores their flagging energy by the deposit of energy-producing sugar. But when the process of degeneration proceeds faster than the process of repair, when, that is, the muscles become clogged with the waste products of effort faster than they can be cleared, and when they lose more energy than can be replaced in the same time, their further effort soon becomes impossible, and *rest* is necessary if recuperation is to be effected.¹

In following up our subject of man as a mechanism, we shall discover an interesting parallel between the bodily fatigue which men and women experience during a day's work representing average activity, and that of the muscle of a lower animal which has been isolated and subjected to electrical stimulation. Thus the daily output curve of a group of workers engaged on repetition work will often resemble in its form the shape of the curve-mass made on a smoked drum by the movements of a frog's gastrocnemius muscle stimulated by electric shocks at intervals of two and a half seconds and made to lift a given weight at every contraction. The similarity in the general shape of the curves is noteworthy.²

The characteristics of all work curves can be illustrated from these diagrams. At the beginning of every task there is a period of adaptation during which the human engine is being warmed up, so to speak. After this period is passed through, the effects of practice begin to make

¹ Expressed in chemical terms, glycogen or digested sugar ($C_6H_{10}O_5$) disappears from the muscles during work, while carbon dioxide (CO_2), lactic acid ($C_3H_6O_3$) and acid potassium phosphate (KH_2PO_4) are liberated. Rest restores the glycogen.

² See *The Human Machine*, F. S. Lee, p. 12, for illustrations.

24 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

themselves felt and the efficiency curve rises, continuing to do so till fatigue begins to tell with more effect than practice, and then there follows a gradual fall in the output of work. An interval of rest is usually sufficient to restore efficiency, but the length of this rest interval will vary with the amount of fatigue to be counteracted. In the first curve below it will be seen that fatigue appears sooner in the morning, which suggests that the effects

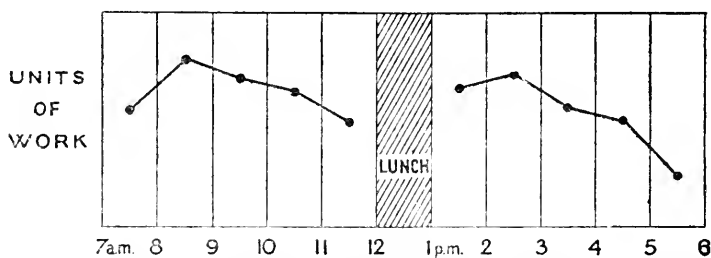


FIG. 1.—Typical output curve for repetition work. (From the *Human Machine*, F. S. Lee.)

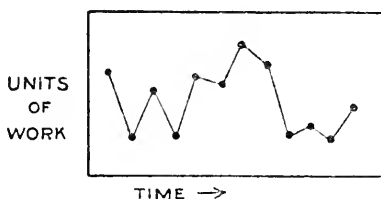


FIG. 2.—A typical work-curve of *one* worker revealing individual variations which are obscured in the curve of average or total output such as that in Fig. 1. (From *Text Book of Experimental Psychology*, C. S. Myers.)

of the earlier spell of work have not all disappeared. In the individual work curve there are shown, too, the zigzag effects of imperfect and varying adaptation, while in the tail of the curve we have the phenomena of an “*initial*” and an “*end*” spurt represented. These variations from the more general form of output curve (Fig. 1) betray the presence of something more complex than mechanical effort.

Such curves as these of work performed will give the intelligent works manager, who has similar ones constructed from whatever details are accessible to him, a shrewd idea of what is happening in his workshops. If his curves correspond roughly to that of Fig. 1, he may be sure that a good day's work is being done. If there is neither a marked rise nor a marked fall in the curves, it will be a sign that the work done is in no way exacting. A distinct fall towards the end of a work-period will usually show that the work is fatiguing to a considerable extent. This may be due to external conditions over which neither he nor the workers have any control, but it may nevertheless *pay* him to cut down the length of the working period, or introduce a regular fifteen minute break twice a day, so that such fatigue will not be able to make itself felt to the same extent.

This systematic use of the *rest-pause*, which in its modern form was popularized by Dr. F. W. Taylor, the originator of the Scientific Management movement, is one of the most interesting of mechanical devices for combating human fatigue. Rest-pauses during work have, of course, always been customary: sheer necessity has rendered them imperative.¹ Before it could be demonstrated scientifically that they were economical they were often forcibly imposed through the prestige of religion. But the arguments for, let us say, the seventh-day cessation from labour are none the less effective when given a new and additional basis in the results of experiment.

Maggiora was the first to demonstrate by experiment the practical utility of carefully arranged rest-pauses² by his experiments with Mosso's finger dynamometer,

¹ "In the East end of London girls engaged in the manufacture of food go to the unattractive lavatories for a break in their work, and for a little food during the second five-hour spell." (Proud, *Welfare Work*, p. 164.) To prevent this sort of thing glass panels in doors in such places are a common institution: a remedy worse in its mental effects than the disease.

² Maggiora: "*Les lois de la fatigue*" (*Arch. ital. de biol.*, xiii. 187).

a piece of apparatus for measuring the muscular power of the fingers. The scientific argument for the rest-pause founded on these experiments is that it prevents work being misspent when done against the pressure of fatigue. The more fatigued the muscles are, the greater is the effort needed to continue working; but if it is made, the greater will be the time needed later for subsequent recovery. If, for example, I have attached to my finger a weight of six kilograms ¹ which I raise slowly and regularly in time with the beating of a metronome, I may find that whereas after one movement a rest of ten seconds will suffice to restore the power of the finger completely, after fifteen movements, instead of ten times fifteen seconds, or two and a half minutes, being necessary as might perhaps be expected to restore the finger to full power, I shall need about half an hour's rest, and that after thirty movements my finger will be quite exhausted, and need two hours for its recovery. This illustrates what Mosso, the first of the modern fatigue investigators, called the *usury* of fatigue.

By the frequent utilization of rest-pauses properly distributed we can prevent fatigue from pressing too hard upon us, and by arranging that heavy work is done only when we are freshest, we can considerably increase output without increasing fatigue. This means that we can arrange for ten hours' work to leave us no more fatigued than five or six hours' work badly organized, and that in five or six hours of well-planned labour we may achieve as much as in ten hours during the latter half of which we are struggling both to work *and* to fight fatigue.

As a result of carefully arranged and personally superintended experiments, Dr. F. W. Taylor was able to demonstrate the particular value of the well-planned rest-pause.² His experiments, now classic, which it is difficult *not* to mention, were undertaken in connection with the work of loading pig-iron into railway trucks.

¹ Maggiora: "Les lois de la fatigue" (*Arch. ital. de biol.*, xiii. 187).

² F. W. Taylor, *Principles of Scientific Management*, pp. 70-71.

At the works of the Bethlehem Steel Company (U.S.A.) he took charge of a gang of about seventy-five men employed at this kind of work. Each man had to pick up a pig weighing about 92 lb., walk up an inclined plank to a truck with it, and drop it into position. The gang was found to be loading on an average $12\frac{1}{2}$ tons per man daily, an amount which compared favourably with the amounts of similar gangs elsewhere. Taylor worked out mathematically (by a process which he does not explain) the percentage of time during working hours when a man ought to be "under load." This time varies with the type of work, and should be less when the work is heavy than when it is light. Obviously it is less harmful physically to the ticket examiner, let us say, at a railway station to be fully engaged for 80 per cent. of his working period than for the pig-iron loader to work continuously for the same proportion of his time. Taylor calculated that during the working day the pig-iron loader ought to be under load for 42-43 per cent. of his time. During the remainder of the period he ought to rest thoroughly from exertion. Taylor therefore arranged for the benefit of his loaders a series of alternating working-spells and rest-spells. By a bribe of increased pay he persuaded one man after another to adopt his method of working with frequent rest-pauses, and finally succeeded in getting all his pig-iron handled by chosen workers (the less efficient being dismissed) at the rate of 47 tons each per day, claiming that his men suffered no more fatigue at the end than when they had previously loaded but $12\frac{1}{2}$ tons a day.

Another instance of the greater effectiveness of labour thus organized may be quoted from the *New York Times* of May, 1914. A writer describes his experience of the value of the rest-pause in the following words:—

At these works there was recently constructed a long incline up which heavy loads were to be wheeled in barrows, and premiums were offered to the men who did or exceeded a certain amount of this labour. They attempted it vigorously, but none succeeded

in earning any of the extra money ; instead they all fell considerably below the fixed task. Prompt investigation by an expert disclosed that the trouble lay in the fact that the men were working without sufficiently frequent periods of rest. Thereupon a foreman was stationed by a clock, and every twelve minutes he blew a whistle. At the sound every barrowman stopped where he was, sat down on his barrow and rested for three minutes. The first hour after that was done showed a remarkable change for the better in accomplishment ; the second day the men all made the premium allowance by doing more than what had been too much ; and on the third day the minimum compensation had risen on the average 40 per cent., with no complaints of over-driving from any of the force.

It must be remembered, however, that unscientifically arranged rest-pauses may do more harm than good. They may make rest compulsory in the absence of fatigue, and so spoil the continuity and efficiency of a spell of work which is being carried through with zest ; or they may be too short and too frequent, or too long—too short to bring about adequate recuperation, and yet frequent enough to interrupt working efficiency ; or they may be too long because the worker has to waste subsequently a disproportionate amount of time in effecting a re-adaptation to his task. Thus to illustrate the last point. At a bleaching establishment the girls were allowed three free intervals a day of forty-five minutes each for rest and meals. When in place of these intervals there were substituted more frequent ones of twenty minutes each after work periods of eighty minutes, there was an increase of 60 per cent. in the output.

A consideration of the question of the best length for a working day is another matter in which the psychologist as a student of the human machine and the engineer as interested in output are interested. Much has been done in the way of actual experiment since Robert Owen in 1816 suggested that a ten-and-three-quarter-hour day might be more productive than one of eleven-and-three-quarter-hours.

Miss Proud (*Welfare Work*, Appendix II) quotes an

early experiment undertaken by Mr. Robert Gardner at Preston in 1845. As the result of a decrease in the number of hours worked daily (from twelve to eleven) he was able to demonstrate that the earnings of his spinners and weavers actually increased. "At a time when Nassau Senior gave the weight of his academic knowledge to the doctrine that the whole profit of the manufacturer was derived from the last hour of an eleven-and-a-half-hour day, and the *Spectator* set to work to refute his arguments by *a priori* reasoning . . . the simple evidence of a manufacturer who had actually reduced hours without loss of any kind was really astounding."¹ During the war it was brought home forcibly to the nation as a result of its experience of munition making without adequate rest, that a lengthened working day and working week did not automatically result in a proportionately increased output. This reveals but another aspect of the rest-pause problem.² Rest-pauses of a definite length are necessary between the working days and the working weeks just as much as between the working periods of the individual day.

The eight-hour day has now been established in most industries, but it has had to be done in the face of great opposition, and the old system is still with us everywhere, disguised as *overtime*. Granted that overtime may often appear necessary, it is nevertheless thoroughly

¹ *Op. cit.*, p. 25. The best known experiments carried out in verification of Gardner's results were undertaken at the Salford Iron Works, 1893 (see Mather and Platt, *The Forty-Eight Hour Week*), the Zeiss Optical Works, Jena, 1901 (see Abbé in *Gesammelte Abhandlungen*, Bd. 3, 1906), and the Engis Chemical Works, near Liège, 1905, (see Fromont, *Une expérience industrielle de réduction de la journée de travail*).

² One should distinguish between the rest-pauses necessitated by bodily fatigue and those due to a temporary inconvenience. Thus those who labour vigorously and speedily at hot work can only do so for short periods, and then need time to "cool off." The energy they use up is not considerable, and proper ventilation would probably enormously increase efficiency by making longer working spells possible.

30 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

uneconomic and will not bear investigation. It spreads fatigue by contagion through the days that follow it. But if they must be worked, it is better to arrange overtime periods during the days when fatigue is the least marked and the organism better able to withstand it, and these will probably be nearer the beginning of the week than at the end, when every ounce of energy expended will exact its maximum usury.¹

As an illustration of the greater efficiency of the shorter working week a few cases may be quoted. In one British factory during the war a decrease from 58·02 to 41·02 in the average hours worked weekly was accompanied by an increase of 22 per cent. in the output (sizing fuse bodies). In a second munition factory a decrease from 66·09 to 45·06 in the average hours worked weekly by women workers in turning aluminium fuse-bodies resulted in an increase of 9 per cent. in the output. In a third factory there was a fall of just 1 per cent. (milling screw threads) when the average hours worked weekly were reduced and fell from 64·09 to 48·01. The loss in this case, however, was more than counterbalanced by the saving in factory lighting and in the wear and tear of machinery.² Muscio says that—

A large firm with shops both in Lancashire and in Belgium found that on identical work the output per man was greater in Manchester with its fifty-one-hour week than in their Belgian factory, where the week ran to sixty-six hours.³

In the light of the foregoing facts it will be clear that nationality and climatic differences do not completely account for this result.

It remains to be said, of course, that as working conditions vary considerably it is impossible to hope for full efficiency by the universal imposition of a standard work-

¹ See Kent, A.F.S., *An Investigation of Fatigue by Physiological Methods*.

² Memo. No. 18, Health of Munition Workers Committee (1917).

³ Muscio, *Lectures in Industrial Psychology*, p. 67.

ing day of uniform length. Nor must it be expected that a reduction of hours will *always* be followed by an increase in production; such an increase can only be expected when the reduction is made from a number which exceeds the *optimum*. Again, as Miss Proud¹ has rightly remarked:—

The psychological effect on the workers of any reduction of hours renders a purely physical estimate of results inadequate. The distrust which usually haunts the minds of any workers when their customs are broken expresses itself unconsciously in their movements. If a reduction of hours from eight to six were made without any stated reason, they would probably think that there was a shortage in the demand, and they would perhaps be slow in order to prevent further reductions. If a reason were given, it would necessarily influence the result. This is a seemingly insuperable difficulty in attempting any generalization as to the effect of altering hours. Even if it were possible to permit factory workers to go when they had finished a definite task, there is no guarantee that the work would be done as quickly as possible, for they are always on guard against the unknown, and possibly compromising, motives of the employer.

The phenomenon may even be more complicated still, as is evidenced by the statement recently² of the President of the Board of Trade that in the mining industry, where psychological factors at present outweigh economic factors, a reduction of hours from eight to seven ($12\frac{1}{2}$ per cent.) has been followed by the altogether disproportionate reduction in the output of from 259 tons per annum per man to 203 tons (26 per cent.).

When, however, we have arranged our working-spells and our rest-spells so that the greatest possible efficiency results therefrom, we shall find that we have not eradicated fatigue entirely, and we shall still need to search for the cause of many individual variations of effort. Such fatigue as we have so far discussed is similar to that shown in the ordinary ergographic experiments. The ergograph is an instrument similar to the finger dynamometer

¹ Proud, *Welfare Work*, p. 159.

² August, 1920. (See Press Reports.)

already mentioned, designed (usually) to secure and hold fast the arm and hand of a subject while the hand or a single finger can be employed in continuously raising a weight.¹ It has been demonstrated that when the hand or finger cannot perform any further work it is not really exhausted, because if the weight is changed for a less heavy one *a continuation of effort is possible*. That is to say, the muscles are not really exhausted when they normally cease to function. Though, therefore, we have discovered in muscular exhaustion a fundamental cause of fatigue, we must seek for the cause of "lowered capacity for work" not solely in the muscles but elsewhere as well.

There are good grounds for the opinion that our muscles cease to function efficiently not when they are nearing the limit of exhaustion, but much sooner, either when, as many have thought, the motor end-plates by which they are attached to their motor nerves begin to suffer from the effects of exertion, or, as Prof. Sherrington maintains, with the results of his brilliant researches to support him, when the resistance in the passage across the synapses between the afferent nerves and the motor² nerves implicated is increased through repeated use. But the conditions which are responsible for fatigue as it is manifested in the decreased efficiency of the nervous co-ordinations and adjustments are much less open to experimental investigation than those underlying muscular fatigue.

¹ See diagram in *An Introduction to Experimental Psychology*, (C. S. Myers), p. 104.

² The student is advised to familiarize himself thoroughly with the elementary facts concerning the nervous system, since the mental life cannot profitably be studied apart from its physical basis.

§ 2. ORGANIC VARIABILITY

What is the reason for the striking absence of mechanical uniformity in the behaviour of the human organism during labour? Fatigue effects do not seem to accumulate with any measure of regularity, and a continuous fall in efficiency is the last rather than the first thing we shall normally expect to reveal itself in a fatigue investigation. It is known that alcohol and other drugs may stimulate the jaded worker into increased activity, while it is equally well recognized that emotion may intervene at any moment to spoil the smooth outline of a perfectly developing work-curve. Now, the capacity for effort is probably maintained and fatigue frequently "masked" through the accelerated activity (under certain conditions) of the glandular systems, the functioning of which is closely connected with our emotional life. The glands control the processes of growth, the digestion of food, and the elimination of many waste products, and whatever disturbs us emotionally, disturbs, too, their normal activity. A study of the ductless glands, particularly, has thrown a considerable amount of light on the manner in which, under the spur of emotion, animals increase their efforts to work, fight, or escape from danger.

A considerable body of evidence, therefore, is available to help us to understand how man as an organism with a highly developed nervous system suffers considerably through the influence of noise, extremes of temperatures, bad atmospheric conditions, defective lighting, anxiety, irritation, and other similar objective or subjective factors. Obviously, those who are called upon

to work continuously at tasks involving fine and highly-skilled motor co-ordinations which can be maintained only with difficulty will be especially susceptible to nervous fatigue under conditions of emotional strain.

The enlightened employer is fully aware to-day of the fact already emphasized that the mere regulation of the hours of labour and of rest-pauses, though an important and necessary duty, will not of itself secure full working efficiency, so that he has naturally become interested in finding additional ways and means towards the betterment of working conditions.¹ But the community, too, is equally interested in the well-being of the worker, as is testified by the inclusion in the Workman's Compensation Act (1906) of occupational diseases—e.g. poisoning by lead, phosphorus, arsenic and mercury, miner's nystagmus (an eye trouble), glass-maker's cataract, boiler-maker's deafness, and so on—as legitimate grounds for recompense.

A great deal may be done to improve working conditions and to lighten exertion by attention to temperature and ventilation conditions. Common sense has always held that an open-air life is healthier and less fatiguing than an indoor life, though we have had to wait until recently to understand why. It was thought that factory occupations were more enervating than the occupations of the field because of the comparative impurity of confined air. The relative proportions of oxygen and of carbonic acid gas and other foul constituents of the atmosphere,

¹ Dr. T. M. Legge, H.M. Medical Inspector of Factories, distinguishes three periods in this connection in England: (1) 1800 to 1850, during which the disgust of educated men at the exploitation of workers found expression in the limitation of the hours of labour to forty-eight per week for children and sixty-nine for young persons and women; (2) 1850 to 1906, a period characterized by attention to accident prevention, as shown by the enforcement of the guarding of machinery; (3) 1870 to present day, a period during which we have begun to regard industrial diseases as preventable. But we have not yet brought ourselves to regard industrial overstrain as a ground of compensation.

however, matter very little when set side by side with other factors. Dr. Leonard Hill has demonstrated¹ that it is not the chemical composition but the bad physical conditions of confined atmospheres which exert the greatest influence for ill on health and happiness, that it is their lack of adequate cooling and evaporating powers which makes them harmful, that variability in the air is just as important as in diet or occupation, and that a room (or climate) in which the atmospheric conditions vary frequently but not unduly much about the optimum temperature (64° F) is decidedly more healthy than one which remains uniformly at the optimum. There is also reason to believe that in ordinary temperatures moderately humid air is healthier than dry air. The problem therefore of the works manager is to keep the air in the workshop in constant movement without causing excessive draught, and the problem for the industrial scientist of the future is to restore to cities and factories the sunlight, the open-air conditions, the colour and the rural associations² which in our haste to ensure progress we have lost.

There is another problem, that of decreasing the amount of noise caused by the running of heavy machinery which has not yet been considered important enough to demand serious practical treatment. It has unfortunately been believed that those who work in noisy surroundings grow accustomed to such disturbing influences as are more or less continuous, that they do not *notice* the noises which upset the stranger, and so are not affected by them. Nevertheless, subconsciously, if not consciously, the worker has to adapt himself to these noises, and he becomes the more fatigued if in addition to responding to the demands of his employment he has to be reacting continuously, perhaps in a different rhythm, to irrelevant sounds. It is the function of the nervous system to mobilize the

¹ See Leonard Hill, *Atmospheric Conditions and Efficiency*.

² We do not think it necessary to dwell upon the unsuitability of our nature for continuous night work,

forces of the organism to meet the requirements of life, and though this often entails the inhibition of unnecessary responses (e.g. to industrial noises), and is therefore apparently negative, it nevertheless necessitates an expenditure of nervous energy which accelerates the onset of fatigue. The unthinking person often expresses surprise that a good mother, for example, is sensitive during her sleep to the slightest sound or movement of her baby, but it must be remembered that she is not completely at rest in such circumstances, but subconsciously undergoing the whole time a considerable nervous strain. That such subconsciously noticed noises can fatigue us is evidenced by the fact that in one case the removal of some operatives from the noisy corner of a workshop to a quiet corner resulted in an increased output of 25 per cent., without apparent increase of fatigue.

A writer in *The Times*¹ has suggested how the harmful effects of noise may be practically demonstrated, if as we say they exist.

Two shops or rooms engaged in producing the same article or "part" might be set aside as the basis of experiment. The output of each of these should be carefully recorded during a certain period, allowances being made, as far as possible, for inequalities, e.g. skill of employees, lighting, ventilation, and so on. One of the rooms should then be "silenced" so far as possible, i.e. the noise of machinery or of working processes eliminated by every possible means. The other shop would be left in its former state of noisiness. Output should then again be recorded over a stated period and the results compared. It would then be a simple matter to estimate whether or not increased output in the silenced room paid for the cost of transformation. In addition the views of the workpeople would prove of great value, for it is abundantly true that every step which makes life more tolerable and more comfortable for the employee rebounds to the ultimate advantage of the master.

Noise exerts its greatest influence for evil when we are for some reason or other just "below form," when the

¹ *Trade Supplement*, April 3, 1920.

nervous system is able to adapt itself to an ordinary task, but fails when in addition to what is customary many other disturbing factors have also to be taken into account. Thus, a teacher who is continually surrounded by noisy children is apt to lose his original tact and patience; in other words, the perfect equipoise of a healthy unworried mind is no longer his. We speak of this type of phenomenon as *regression*. It is almost universally true that in times of severe stress or annoyance we are apt to fall back into the ruts of old habits, and display an instinctive behaviour of which we should normally be ashamed.

Under certain conditions, however, an overstrained nervous system may apparently function with efficiency. These conditions involve the presence of an *emotional* stimulus to increased effort. Emotional excitement accompanied by disturbance in the sympathetic nervous system will frequently cause the adrenal glands to secrete adrenin into the blood, an action which by bringing about the liberation of energy-producing sugar from the liver for the use of the muscles, and increasing the rate and force of the heart-beat, promotes effective muscular innervation. Cannon¹ who has done much of the pioneer work in elucidating this subject, says, "What rest will do after an hour or so, adrenin will do in five minutes or less."

But continuous exertion which has emotional excitement as its spur is even more fatiguing ultimately than excessive muscular activity, and is one of the causes of nervous breakdown.

An investigation of the peculiar distribution of industrial accidents through the working day would probably yield evidence in support of the view that emotional interest braces up the tone of the system, thus increasing alertness. One can readily understand that as the day wears on and fatigue increases the number of accidents will tend to increase, too, but what is not so intelligible is that usually there is a marked fall in this number just

¹ *Bodily Changes in Pain, Hunger, Fear and Rage* (New York).

when fatigue ought to be at its maximum, i.e. in the last hour of the working period. Several explanatory suggestions have been put forward, such as the fact that fewer workers are then active, and that a more leisurely rate of work prevails; but since there is a similar fall in the accident curves in almost *all* factories, it is probable that the *mental attitude* of the worker has much more to do with the infrequency of last-hour accidents than has been suspected. This infrequency is due to the existence—in most cases—of what is, in psychology, called “end-spurt.” We have already referred to this phenomenon. It is when a worker becomes conscious that he is nearing the end of his task that “end-spurt” begins to show itself either in a quantitative increase of effort to maintain output, or in a qualitative increase of the accuracy of his co-ordinated movements, or in both. The prospect for the worker of an early release from labour, the realization that he will be able to get through his task with less fatigue than he had anticipated, may revitalize and re-energize him; or the fear that he may not have time to finish his task may speed up and improve his efforts considerably. A favourable emotional reaction is probably responsible for a considerable amount of his increased efficiency. In the conscious regions of his mind there may, too, be memories and anticipations of happily spent leisure which will play their part in bracing him up and producing a greater alertness of mind.

A fall, however, in the number of accidents in the final working hour may, when compared with output figures, not always be a real fall. If we take the output figures and the number of accidents for a given day and calculate the average hourly rate for each, then the ratio of one to the other can readily be compared with the ratios for each actual hour. If the accidents fall in the last hour from 120 per cent. to 105 per cent., and the output from 100 per cent. to 75 per cent., then the accident risk has really risen from 120:105 to 100:75, or from 1.2 to 1.4.

Much fatigue study, however, proceeds upon the

assumption that all effort needs elimination. But fatigue is inseparable from life, and the principle to bear in mind is that it is the fatigue of joyless effort which calls most urgently for diminution. It is possible actually to enjoy bodily fatigue, while that which interests us fatigues us in quite a different way from that which is uninteresting. It is the fatigue which is caused through a continuous emotional adaptation of the wrong sort that is most destructive of human efficiency. It may be, then, that if muscular fatigue can co-exist with mental contentment, it is this more subtle form which is at the seat of labour unrest. Our inquiry, therefore, must be carried a stage further.

ADDENDUM

No. 9 Report of the Industrial Fatigue Research Board recently issued contains some interesting statistics bearing on the relation of temperature and lighting to output in the silk-weaving industry.

During a period of three weeks when two and a half hours of good artificial light were burned daily the output was 10 per cent. less than in periods when such light was unnecessary. There was, moreover, a steady increase in output in the period from Christmas to March, during which the days began to draw out. There was also an increase of from 200 to 250 units of work recorded during a period when the temperature was rising from 59° to 65° F.

§ 3. MENTAL FATIGUE

A study of *output figures*¹ is an excellent introduction to an understanding of the real nature of industrial fatigue, for they reveal it as being not wholly a diminished efficiency of the muscles or the nervous system but a diminished efficiency of the *human will* in addition. Some writers who have formed no working conception of a fatigue of the will deem that it is necessary to assert that feeling tired and being tired need not be the same thing; there is no close relation, they will say, between the feeling of fatigue and the fact of fatigue.

Now, it is quite *true* that there is no marked correlation between the feeling of tiredness as experienced under the ordinary working conditions of everyday life and the physiological capacity of the organism for further work. As Dr. C. S. Myers writes,² "To feel fatigue is by no means inconsistent with the performance of increased muscular work; the former is never a safe criterion of the latter." Here we may conceive activity as perhaps continuing because of its own momentum. Usually, however, we feel too tired not to *cease* effort, but to *initiate* it. In such a condition we may well imagine that the human engine still retains possibly a large part of its latent energy and efficiency, but that the *will* to set it going is defective.

It would seem imperative that we should form a conception of the existence of fatigue in the higher levels of human life, in the will, the interests, and in the creative aspirations, as well as in the muscles and the nervous

¹ Output figures are an unsatisfactory indication of fatigue in the machine operator because they measure the efficiency of the machine as well as that of the worker.

² *A Text Book of Experimental Psychology*, p. 177

system, if we are to form a complete picture of our problem. Surely here will be revealed an important aspect of fatigue, and, indeed, it has always occupied a conspicuous place in the attention of those practical organizers whose work it has been to galvanize large masses of men into activity and enthusiasm and to maintain them in this condition. Such a problem is the preoccupation of the industrial organizers of Soviet Russia to-day. The military chief speaks in this connection of the *morale* of his men, and tells us quite bluntly that a B2 army of men with an excellent *morale* will suit him better than an A1 army with a *morale* that is low and staled. For discipline involves control of impulse, and is apt to fail when fatigue creeps into the higher centres of mental life. Let us, then, for the present distinguish between the fatigue of the body and the fatigue of the energizing spirit within the body, and let us be on our guard against supposing that when we have eliminated the former we have established all the conditions of human efficiency. That we are at present unable to study closely what we may call the fatigue of the will should be no bar to our admission of its existence.

It may, of course, be theoretically sound to maintain that every form of fatigue has a physical basis, but for practical purposes it will be wise and helpful to recognize a working distinction between mental fatigue and physical fatigue, between the inability to set the human machine in motion and the inability to keep it running, the more so because defects of the "will-to-energize" cannot yet be profitably attacked through the *body*. The prevalence of neurasthenia among modern workers, for example, may not be due so much to a hypothetical wear and tear of the nervous system through the demands of industrial life as to the strain caused by individual difficulties of securing a satisfactory mental attitude towards the work performed; the right perspectives are wanting; the machine can never be set fairly running except at a too great expenditure of mental energy.

The army commander who conducts a long and tedious campaign knows how important it is to keep intact the spirit of his troops. There may occur a fatigue of the will—or what we colloquially call a “fed-up” condition—even when the bodily vigour of the men remains unimpaired.¹ Thus in 1917 the Russian Army of nearly twenty million men tired of the war in which they were half-heartedly engaged, and losing their will-to-endure relapsed into anarchy with amazing energy.

As an illustration of how such an apparently non-physical thing as an *attitude of mind* may affect working efficiency, the following instance may be quoted (though we admit that such a single and unsupported instance may appear unconvincing). In our own country, at a military hospital, Dr. J. A. Hadfield asked three men to try the effect of suggestion on their strength, which was measured by gripping a dynamometer.

I tested them (he says)² (1) in their normal working condition; (2) after suggesting to them under hypnosis that they were “weak”; (3) after suggesting under hypnosis that they were “very strong.” In each case the men were told to grip the dynamometer as tightly as they could—that is to say, extend the will to the utmost. In the normal waking condition the men gave an average grip of 101 lb. When, under hypnosis, I had given the men the idea that they were very weak, the average grip was only 29 lb., one of them, a prize-fighter, remarking that his arm felt “tiny, just like a baby’s.” My suggestions of strength produced an average grip of 142 lb., as against the 101 lb., which was the best they could do in their normal working conditions.

The establishment of mental attitudes favourable to continued effort along lines of activity which are not immediately connected with crude self-interest is an exceedingly arduous task, but a highly important duty, since we shall

¹ We should remember, however, that “misguided efforts to stimulate workers to feverish activity in the supposed interests of the country are likely to be as damaging to the desired result as the cheers of partisans would be if they encouraged a long-distance runner to a futile sprint early in his race” (Vernon, Mem. 7, *Health of Munition Workers Committee Reports*).

² From an Essay in *The Spirit*, edited by Canon Streeter.

be confronted in the future with *morale* problems of growing complexity in all the avenues of social progress. The beliefs and aspirations of the workers play a great part in warding off (or bringing on) fatigue. A widespread acceptance of the belief, for example, that the wage-earners could never really improve their status would be enough to break beyond repair many of the ordinary springs of conduct, deaden all human initiative, and restrict their efforts to the attempt to satisfy bodily needs. In industry we have, then, at once, to work out the rudiments of the science of human economy and organization, and see that unnecessary fatigue is abolished. We shall not solve our problems by exclusive attention to the mechanical forms of fatigue. But though we may not know precisely what the more subtle forms of human fatigue are, we may, like the electrician who is ignorant of the real nature of electricity, learn how to deal in action with the phenomena which we still, in theory, fail to understand.

We may here fitly reconsider the question of the rest-pause. Regarded from any other point of view than the purely mechanical, the problem of the industrial rest-pause does not altogether lie in the necessity for discovering the *quantity* of time which will enable the worker to recuperate *physically*. There is also the almost untouched task of experimenting with the *quality* of the rest-pause and the problem of how it may best be filled to ward off, not just muscular tiredness, but nervous strain and indifference or boredom as well. The widespread "Monday feeling" ¹ is an eloquent testimony to the fact that mere *quantity* of rest is no remedy for the fatigue which is not physical.

¹ In their *Interim Report* the Health of Munition Workers' Committee suggested the introduction of rest-pauses after the completion of each separate task, so that the more quickly each is performed the more pauses might be employed. They advocated as an experiment, moreover, the payment for these pauses *at an increasing rate*. But see p. 107.

44 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

Bearing in mind that fatigue may vary both in quality and in quantity, and that a remedy which ignores this fact may be worse than the disease, we shall in our next chapter proceed to an analysis of the methods already in existence of eliminating it.

Before doing so, however, let us return for a moment to the subject of accidents, for we find the industrial accident standing in close and intimate relation to fatigue, as shadow is related to substance, in the opinion of some investigators.

Many have regarded the casualties of industry as inevitable, and as due either to *unforeseeable* contingencies or to the *irremediable* carelessness of the average worker in the presence of machinery. Such an attitude is no longer reasonable, for we have indisputable evidence in the shape of statistics showing quite definitely that the frequency of accidents depends on and varies with just those factors which we particularized as being responsible for the onset of fatigue—bad atmospheric conditions, defective lighting, excessive speed and noise of machinery, absence of rest-pauses, general unrest, and so on.

Since science invariably begins with attention to the mechanical aspect of its problems, it was natural that the first step taken to reduce accidents should have been to introduce the mechanical device of providing safety-guards for fencing off dangerous machinery. Since, however, only about one-third of our industrial accidents are due to contact with machinery, and since it is calculated from extensive American experience in accident-prevention that this number can be reduced only 10 per cent. even by a perfect system of safety devices, we must not only guard our machinery at its danger points, but seek out better methods of reducing accidents as well. These better methods will involve an appeal to the individual "selves" which have failed or which are likely to fail to control effectively the functioning of their overstrained nervous systems in response to the stimuli of the external world. We may accordingly appeal to

the human *animal*, that is, to an instinctive-emotional tendency which may possibly brace up the worker through glandular discharges, or we may appeal to the rational personality who has been or is likely to be caught slumbering.

Both those things are being done successfully by the *Safety-First Associations* in England (where the idea originated) and America (where it was first extensively developed). At Port Sunlight well-planned propaganda work has decreased the number of accidents in one year by 50 per cent. Twelve years educational work in America has resulted in a 75 per cent. reduction. But the "safety-first" promoter is not content with quoting figures, nor does he usually proceed by the method of informing the worker that it is highly important that he should be careful, but he employs the less gradual methods of the advertiser. The worker must be kept alert; he must not be allowed to feel that he is naturally immune. A little fear is the best insurance against disaster. Illustrated posters in colour which show concretely and forcibly what accidents are possible and what they involve¹ are put up where they will be conspicuous, and they are *frequently* changed. In addition, a safety inspector appointed by the management (which has discovered that it pays financially to prevent accidents) visits the scenes of accidents with a committee composed of workmen and representatives of the firm, and it is their duty to analyse causes and formulate preventive measures. This committee, in future, will probably be the local Works Committee, who will naturally connect up with their investigations into accident causes such factors as lighting, ventilation, and space accommodation.

According to a newspaper report, some of the devices adopted by English and American firms for interesting their employees in the idea of "safety-first" are: (1) Cinematograph films, illustrating means of preventing

¹ Cf. words of poster, "The wife of a careless man is almost a widow,"

accident; (2) bonuses to employees who offer the best "safety-first" suggestions; and (3) inter-departmental competitions for the lowest number of accidents.¹

The undisputed success of the safety movement demonstrates clearly that the old-fashioned notion of the inevitability of accidents is quite inadequate to explain their occurrence. And indirectly it shows up in bright light the fact that fatigue, in so far as it is a factor responsible for accidents, can be kept within safe limits when *interest* is aroused.

Interest alone will keep the worker continuously alert. The carelessness which comes from lack of interest is, it is agreed, the commonest cause of accidents. But to give a psychological definition of "carelessness" would be difficult. This simple term would probably turn out to be a label for a variety of mental conditions and not the least important of these will probably be that mental fatigue resulting from nervous strain and manifesting itself in a regression from deliberate conscious activity to a lower and more mechanical level of conduct.

¹ The National Safety Council (U.S.A.) provides its subscribing members with (to use its own words)—

- "(1) Three educational bulletins *every week* for workmen's bulletin boards—teaching the men to 'Be Careful';
- (2) One bulletin *every week* for executives and others in charge of safety work—showing how to get results;
- (3) Unlimited consultation privileges from our Information Bureau to solve your own safety problems;
- (4) One Safe Practices pamphlet every month on such topics as Ladders, Belts, Gearing, etc.;
- (5) One News Letter every week;
- (6) A copy of the Annual Congress Proceedings—an everyday reference book on Safety;
- (7) Free use of motion picture films and lantern slides to educate employees;
- (8) Special Service and miscellaneous information as occasion requires."

There is also the British Industrial "Safety First" Association, 31, Westminster Broadway, London, S.W. 1, which issues posters and pamphlets. The Home Office also distributes literature dealing with "Safety" committees.

Our brief survey of the fatigue problem will indicate quite clearly, we hope, how futile it is to expect to be able to measure the amount of effort expended in work by the use of any mechanical contrivance. Thus the ergograph, (already described), the eudiometer (which measures the amount of oxygen consumed by the worker—an accurate indication, to some, of the human energy expended), the cardiograph (for measuring heart-beats), the sphygmograph (pulse), and the oscillometer (arterial pressure), are typical of devices which give us just shadow pictures of the symptoms of the thing we are studying and nothing more. In spite of much excellent work which has been done there is as yet *no* test for the determination of the extent of industrial fatigue which takes cognizance of all its complex forms.¹ But it would be a definite gain if we could bring the phenomenon of mental weariness by unanimous consent into the category of fatigue. Its complete disclosure should be the object of our concentrated effort. In its chronic and most insidious forms it is largely responsible for the disturbed condition of our industrial life.

¹ "The question of a suitable test of fatigue is occupying the minds of many people at the present time. It is generally agreed that the tests already devised and the methods employed are defective in many respects, and cannot be satisfactorily applied to industrial conditions. Those of a psychological nature are usually so different in method and material from the fatiguing industrial processes, that the abrupt change in conditions caused by the application of such tests either during or at the end of a working day may enable the worker to perform them with renewed interest and energy, and consequently give rise to entirely misleading results. In any case, there must be a considerable number of preliminary trials in order to overcome the effects of unfamiliarity and practice. The existing physiological tests appear to be equally unsuitable and unreliable, those which seem to give the best results being more suitable for the laboratory than the factory" (S. Wyatt, *British Journal of Psychology*, x. 293).

ADDENDUM

As indicative of the complexity of our subject we set out below the various factors calling for study which Dr. P. S. Florence has tabulated in his *Use of Factory Statistics in the Investigation of Industrial Fatigue*.

SCHEDULE OF INDUSTRIAL CONDITIONS.

- I. Length and Intensity of Activity.
- II. Factory Conditions : Hygiene and Employment Management.
 - A. *Physical : Time and Place of Work.*
 1. Air: Temperature and Humidity; Ventilation and Room Space; Dust and Fumes, Exhaust Systems; Smell.
 2. Light: Volume, Concentration, Glare.
 3. Noise: Volume, Irregularity, Vibration.
 4. Accident Hazards: Safety Devices; First Aid.
 5. Feeding: Sale of Food; Equipment; Service.
 6. Sanitation: Drinking Water; Rest Rooms; Baths.
 - B. *Social and Economic.*
 1. Flow of Work Depressions and Rush Orders. Routing.
 2. Creation of Staff. Appointment and Dismissal. Permanency of Tenure. Unemployment. Instruction and Supervision.
 3. Maintenance of Production.

Incentives: Natural interest in work. Scale, method and assurance of wage payment.

Discipline.
- III. Nature of the Work.
- IV. Type of Workers.
 - A. *Sex. Age. Race.*
 - B. *Experience.* Date of Entering Industry and Factory. Former Occupations.
 - C. *Habits and Home Conditions.*
 1. The Amount and Use of Earnings. Thrift.

Food: Diet and Time of Meals.

Stimulants: Alcohol and Tobacco.

Sleep and Recreation: House Accommodation and Hygiene.

Support of Dependents.
 2. Method and Length of Transit from Home to Work.
 3. Duties outside Factory (Housework of Women, etc.).
 4. Sexual and Family Relations.
 - D. *Point of View* ("Animus"). Trade-Unionism, Patriotism, Economic Self-interest, Herd-Instinct, etc., General Intelligence,

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CHAPTER III

THE ELIMINATION OF FATIGUE THROUGH MOTION STUDY¹

§ 1. THE WORK OF MR. F. B. GILBRETH

No one at this stage will deny that a great deal of industrial work is quite unnecessarily fatiguing and that a little forethought would eliminate the larger proportion of that which is due to ignorance and carelessness. In this connection the investigator who has probably done more than anyone else to introduce anti-fatigue devices into industry, and whose work has consequently aroused the greatest interest and fiercest controversy, is Mr. F. B. Gilbreth, an American engineer born in 1868. He came under the full influence of the late Dr. F. W. Taylor in 1906, and since then he has devoted himself wholeheartedly to furthering the scientific management movement, making good many of the deficiencies of his master's work. But as early as 1892 he had received a silver medal for devices which reduced considerably the fatigue of bricklayers at their work. Gilbreth's analysis and improvement of the bricklayer's art² has excited widespread admiration and brought him an international reputation, so that we ought to study his methods closely. They were the mature fruit of the seed sown by Taylor in his time-and-motion experiments carried out with the aid of the stop-watch.

¹ See footnote, p. 21.

² See *Bricklaying System*.

During his preliminary observations of the habits of work of several representative bricklayers, Gilbreth discovered to his astonishment that they were all performing thousands of times a day movements which were exceedingly laborious and yet utterly unnecessary ; like Taylor's pig-iron loaders, they often put themselves unnecessarily "under load" and tired themselves when there was no real occasion for doing so. Bricklaying is one of the oldest of human occupations, and yet for centuries those who have followed it have been content without exception to stoop down to the level of the earth every time they needed a brick or a trowel of mortar, thus lowering and raising continually through a space of two feet or so a hundredweight and a half of "bricklayer" each, not to speak of tools and materials. Now, while picking up bricks and mortar from the ground may be excellent exercise, when taken in moderation, for the abdominal muscles, it is not the form of activity for which the bricklayer is chiefly paid, nor is it the sort of performance which gives the bricklayer himself any great pleasure.

Gilbreth was the first man to do what we all now see to be the common-sense thing as a means of cutting out this obviously unnecessary exertion. He had adjustable scaffolds constructed by which the unfinished brickwork could be kept constant in height relatively to the bricklayer, and on this adjustable scaffold he arranged for the loose bricks to be placed, and contrived that these, the mortar-box, the bricklayer himself and the wall should be set in such relation that there was no need for the worker to do more than move his arms and hands, and the parts of the body involved in their use. By attending carefully, too, to the consistency of the mortar (which was subsequently standardized in the most conveniently even form) Gilbreth ensured an exacter and easier method of securing the proper thickness of spaces when the bricks were placed in position, his workers being taught to *press* the bricks into correct relation with their free hand instead of wasting energy in knocking

THE GILBRETH SCAFFOLD.

The Gilbreth scaffold consists of three platforms, for bricklayer, tender and materials respectively.

The bricklayer's platform is at such a height that he can lay bricks or mortar without stooping or reaching upwards.

The bricks and mortar are carried on the stock platform at the height of the wall.

The tender's platform is on the outside of the scaffold and is three planks wide, so that wheelbarrows may be taken along it. The labourer places the bricks from his barrow in small piles along the stock platform.

All three platforms are raised together as the walls grow by means of the rack and jack seen on the right.

This type of scaffold can be set up and taken down more quickly than any other form.

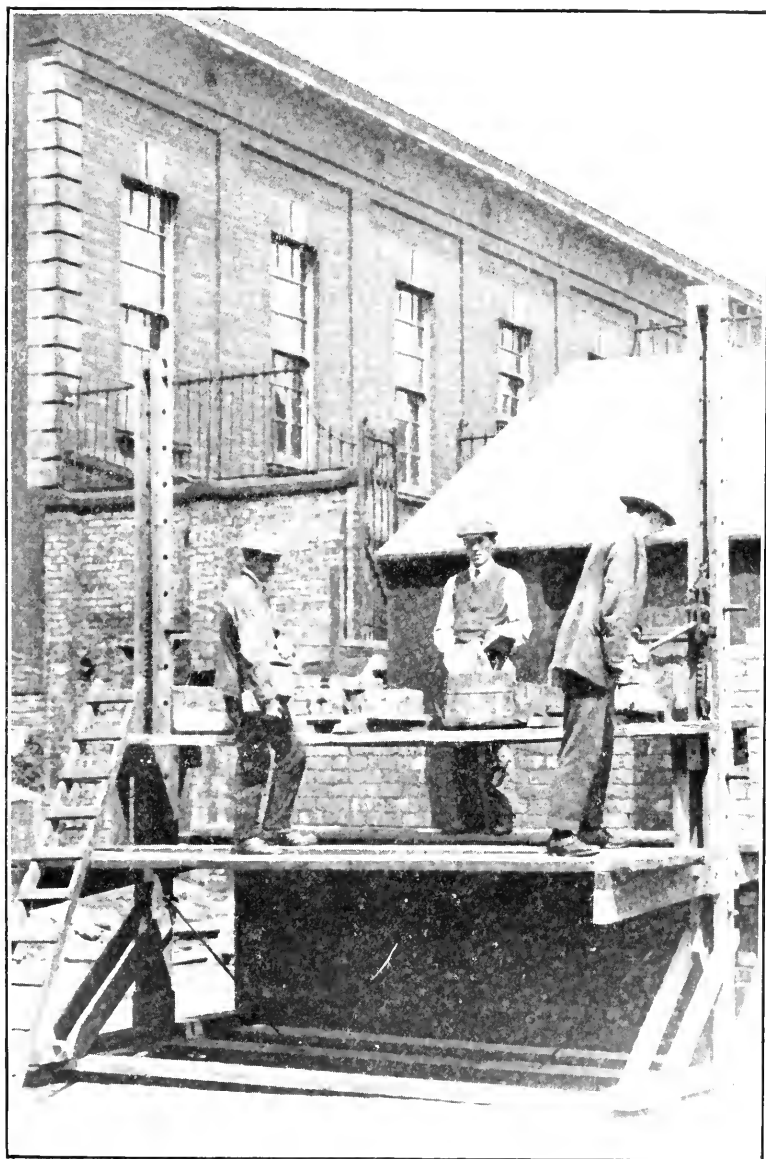
Being made of parts which fit together and which are used again and again, no damage of material is necessary in taking apart and re-assembling.

It secures better workmanship because the bricklayer is always at a proper height in relation to the top of the wall, and thus eliminates and cuts out much of the fatigue caused by this work.

THE FOUNTAIN TROWEL.

An improved form of fountain trowel is in use. By means of this, mortar for twenty-five to thirty bricks can be spread in five seconds.

Photograph by permission of Dr. A. F. Stanley Kent, Director Dept. of Industrial Administration, Manchester College of Technology.



them repeatedly and often unevenly in the traditional manner with the handle of the trowel.

Gilbreth noticed, moreover, as a defect of the traditional method the waste of time and attention involved on the part of the bricklayer when he had to turn about the brick he picked up in order to discover the best face for forward display. The bricks were therefore placed out for him by an unskilled labourer with the best faces already upward. The duty of this labourer was to bring the bricks in "packets" of eighteen to the scaffold-table and put them within easy reach of the bricklayer's hands. Mr. Gilbreth also saw that further effort was wasted when two separate actions were performed each time the bricklayers needed bricks and mortar. The men were consequently taught to pick up simultaneously the brick in one hand and the trowel in the other. We shall return to this point later.

According to Gilbreth the time-honoured method of laying bricks necessitated the performance of eighteen separate movements, whereas the bricklayers whom he trained were able to dispense with no less than thirteen of these movements (of which some were extremely fatiguing), and lay bricks efficiently in five easy movements. In one case, we read with astonishment, bricks were even laid in *two* movements. (?) The resulting increase in output was, as may be expected, a marked one. Bricklayers who had been forced in using the traditional method to work right up to the extreme limit of their capacity, in order to complete a tally of 1,000 bricks a day, could lay, by the Gilbreth method, 2,700 bricks a day with comparative ease.

Fundamentally, the basis of the new method was, as we have seen, to divide the movements of the bricklayer into those which were essential to good work and those which were unessential, to eliminate the unnecessary movements, and to improve by re-synthesis the essential movements for use in a standardized method.

Gilbreth studied in the same orderly manner the work

of the mechanics who were employed by the New England Butt Co.¹ in assembling the machines used in the manufacture of braid. This work had never previously been studied as a problem of efficiency. The base group of the machine parts had been assembled in slipshod manner on a low table. The parts when not in use had been placed aside in loose unsystematic fashion and just allowed to lie about, and the worker had picked up his tools as he needed them from floor or bench, wherever they happened to be. He was consequently often forced to waste time, thought and effort in *searching* for the part or tool he needed just as we might search in a box full of assorted buttons for one particular variety.

Gilbreth conceived the problem before him as being :

(1) To make the table of the most convenient height and shape to hold the tools and the base group as it grew while being assembled. (2) To provide the most convenient temporary resting-place for the tools and the various parts before they were carried to the final position of assembly.²

The new method elaborated and standardized by Gilbreth involved the use of a bench, convenient from the worker's point of view in size and height, and a lattice-work holder or "packet" which could hold the parts, by means of pockets, hooks and other supports. The base of the braider was placed on the bench, and as a preliminary the whole was taken to pieces and placed out on the bench in order of handling, then put away in reverse order into a specially constructed packet in such a manner that each part was easily recognized, and could therefore be moved to its position in the base group by the shortest possible path, while the systematic arrangement of the parts in the order in which they had to be used suggested the obvious sequence of their use. The effect of standardizing the procedure was to eliminate a surprising amount of fatigue and indecision, and whereas by the old method,

¹ Gilbreth, *Fatigue Study*, pp. 134 *et seq.*

² Gilbreth, *op. cit.*, p. 134.

or rather lack of method, the assembly of eighteen base groups was considered a good day's work, by the new method it was found possible to assemble as many as sixty-six daily *without any greater fatigue*. It is interesting to note, too, as an illustration of a fact which Gilbreth repeatedly insists upon (viz. that motion study kindles interest among the workers themselves in economizing movement), that there was afterwards invented by the mechanics whom Gilbreth taught an additional device for taking the parts and carrying them by their own weight along a sliding groove to the next most convenient position of rest, thus obviating the need of carrying them. The principle is capable of extension. Thus an economy could be effected in the printing trade by the modification of the type which would allow the compositor to *feel* with his fingers whether his letters were right way up.

Gilbreth's general method of attacking the fatigue elimination problem has attracted, and deserves the attention of all those interested in studying industrial conditions. Over and over again we find him approaching the problem with uncanny insight, and even those who quarrel about his conclusions are obliged to confess an admiration of his methods. Noting the fact that it is easy to make external changes which never touch the underlying cause of evil, he says,

Worth-while permanent fatigue elimination goes to the fundamentals of the work itself, and studies these in relation to the fatigue. *What* has been done is worth while when we know *how* it has been done, and *why* it has been done. Given these facts, we can determine how it may be done again in the same fashion and possibly even better. The practice that is the result of *accurate measurement*—that is the standard to be demanded.¹

Gilbreth has applied practically all his ideas and methods.

First, then, a fatigue survey had to be made, in order—

- (1) To present an accurate picture of existing conditions from the fatigue standpoint.

¹ Gilbreth, *op. cit.*, p. 3.

- (2) To enable all interested in fatigue elimination to visualize the problem thoroughly.
- (3) To divide the problem of fatigue elimination into such working units that it may be possible to attack the problem successfully from the start.
- (4) To arouse the interest of every member of the organization in fatigue and its elimination.
- (5) To show the relation between fatigue and activity.
- (6) To teach every member of the organization to conserve his working powers.

Gilbreth begins his investigations with attention to the external conditions of work. Thus the lighting should be well distributed, he says, and strike the work and the worker at the least fatiguing angle. Moreover, every possible means should be taken to remove all glare and reflection which fatigues the eyes, so that ornament and bright polish must be sacrificed to efficiency, and, in spite of prejudice, a coat of dull black paint given all shining metal parts. (Gilbreth seems here to overlook the fact that bright surfaces are æsthetically pleasing, whereas dull black depresses the *spirit*, even if it is devoid of the power to fatigue the *eyes*.) The knowledge that there is adequate fire-protection also has a considerable effect upon the mental comfort of the workers, since subconscious anxieties will hinder the workers, and bring on fatigue earlier than is usual.

Equally important as a preliminary step in fatigue elimination is the work of improving work-places and work-tables, of providing and improving chairs, and arranging materials and tools so that they are always ready to hand. Gilbreth believes strongly in orderly methods of work.

The girl selling ribbons who walks up and down behind the counter through an accumulation of paper, cardboard cores, and other odds and ends, has not only the bodily fatigue of pushing the clutter ahead or kicking it aside, but also the mental fatigue that comes from adjusting herself constantly to such conditions.

Orderliness is not imposed, however, but every endeavour made in the Gilbreth type of factory or store to *interest*

the worker in economizing energy and thought. It is this sort of attempt on the part of Gilbreth to educate his workers to the possibilities of personal economy of effort which makes all he does so fascinating.

New types of work-tables and chairs have been constructed by Gilbreth to suit the needs of the worker, and we have an entirely new principle here involved: it is that not only the worker must adapt and fit himself to his work—an understood condition of all factory efficiency till to-day, but his work and his tools must be made to fit *him*. There has, of course, been for ages an unconscious selection of tools which suit the worker, and those we have to-day possess survival qualities which are apt to be overlooked by toolmakers who place novelty of design before utility. Thus wood handles for hammers give not only the balance required for easy use, but also friction enough to make handling firm; boot-brushes and clothes-brushes have grooves along the wooden base which take the fingers and allow for a secure grip; razors have frequently a milled section on the back edge just where they are held by the fingers; fountain pens are best adapted for use when they are not too smooth; and so on. It has been experimentally demonstrated that in shovelling there is one size of shovel only which allows the maximum work to be done.

Gilbreth advocates—what may seem fanciful—measuring the worker for his tools and chairs, and adjusting the heights of tables and seats so that stretching and stooping are reduced to a minimum. His general method is as follows:—

If your problem is to enable seated work to be done standing, raise your work to the standing level, and put your work-chair on stilts with casters, provided the work is not of the kind that requires a chair against which one can push. If your problem is to enable work that has been done standing to be done sitting, construct a chair that will bring the worker to the desired height. If your problem is to reduce vibration, put springs under the four legs of your chair. If your problem is to make sitting work more comfortable, be sure that the chair is of the proper height; that

the seat slopes right and has a rounded front edge ; and that if it has a back it is one that does not interfere with work. If the chair is too high, saw off the legs ; if too low, add wooden blocks.

Gilbreth has even established a public museum in Providence, U.S.A., containing such anti-fatigue devices as we have mentioned. But Gilbreth realizes that all these devices are mechanical devices and do not touch the real springs of energy which must be moved before genuine pleasurable work will be generated among the workers. Moreover, Miss Josephine Goldmark has pointed out¹ the obvious fact that the reformer who aims at a thoroughgoing industrial hygiene must needs see not only that the work-places but also that the homes of the workers are such as will give the best conditions for rest and recuperation of body, mind, and spirit. Hygiene in the factory will be best supported by hygiene in the home ; one without the other will be ineffective.

But the most important form of fatigue to be attacked is the fatigue of the higher mental life. It is as much an essential part of the work of the management to arouse interest and keep it alive, as it is the work of a general to keep his troops nerved to fine issues. The cultivation of *morale* is as important in the factory as on the battlefield. Gilbreth realizes this and claims that demonstrations in the concrete form of the results of his motion study generate an interest among the workers themselves in the problem of eliminating wasted effort. They will already possess a knowledge of the results of motion study, and this renders them able to take the initiative in acquiring skill in the activities of both work and leisure. They adopt a new attitude towards work, and think habitually in terms of motions, inventing for themselves more economical modes of procedure.

Gilbreth attempted further to stimulate his workers by the establishment of what he calls the " Home Reading Box Movement." This is a system of placing reading matter at the disposal of workers. Books, magazines,

¹ *Fatigue and Efficiency.*

trade catalogues, pamphlets and newspapers are placed in a box near the exit from the works. The employees are invited to help themselves, and in turn help to keep the box filled. The system has resulted, according to Gilbreth, in the education of the workers to the possibility of improving methods of work, and made the rest-pauses which were provided real rests, because it provided an adequate means of distracting the mind from the labour just dropped. But here we have a confession that fatigue can only be eliminated by proper attention to the workers' welfare.

In this country there is a rapidly growing tendency to take action against the influences which are responsible for industrial fatigue, through the introduction of welfare supervisors,¹ who work sometimes in co-operation with, but sometimes independently of, the Works Committees in the factories. There are now installed in a large number of British factories such supervisors whose duty is to see that workrooms are adequately ventilated, kept at suitable temperatures, and lighted to the best advantage, that cleanliness is assured among the workers by the provision of sanitary and washing arrangements, that good and well-cooked meals served up in congenial surroundings are available for those who need them, that recreational and rest-rooms facilities are provided during the mid-day pause, and if possible at other times, that records of various sorts are kept relating to accidents and sickness, and that all which can be done to make factory life endurable is being done. As an indication of the value of systematic attention to the hundred-and-one small points which affect the worker's well-being the fact may be instanced that in nearly all West End shops living conditions are in charge of the forewoman, who is

¹ Particulars of the Welfare movement can be obtained from the Industrial Welfare Society or the Welfare Workers' Institute, London.

"Welfare work consists of voluntary efforts on the part of employers to improve within the industrial system the conditions of employment in their own factories" (Proud, *Welfare Work*).

an autocrat in her own department, and brooks no interference. The state of the rooms, therefore, varies according to her temperament, being clean if she has theories on the subject of cleanliness, but not otherwise ; warm if she likes heat, and so on.

The demand for welfare work should come from below ; it should not be *imposed* from above if it is to be effective. If the " Works Committee " in any factory introduces it and supervises it there will be less likelihood that the workers will hold aloof in the belief that the employer has only introduced it because it *pays* him.

The readiness with which bad motives are attributed to management should suggest always the advisability of neglecting no possible way of securing the workers' co-operation.

§ 2. THE TECHNIQUE OF MOTION STUDY

The feature of Gilbreth's work which has attracted most attention and provided the spectacular argument for scientific management is the actual technique which he employed in the analysis of the movements of the worker's body or tools during the performances of a task. When we speak of *Motion Study* or *Micro-Motion Study* we usually refer specifically to this method and technique.

In his desire to introduce measurement into the study of the problems of fatigue, Gilbreth conceived the idea of attaching a small electric lamp to the moving body or tool at work, so that by photographing such a movement with a camera, he was able to obtain a continuous white tracing of the path of the movement as it would appear to an onlooker. Such a representation is called a *cyclegraph*. Fastened to the wheel-rim of an engine such a light would be seen from the front as a white line in such a photograph, while a light fastened to the hand of a woman who is sewing would trace out a path roughly elliptical.

Before measurement could satisfactorily be applied to a movement, however, it was necessary to reproduce the time occupied in the movement, and for this purpose an interrupter of known frequency was introduced into the lamp circuit, with the result that a *chronocyclegraph* was produced, showing instead of a continuous white tracing a series of dashes, bunched together where the movement had been slowest, and spread at greater intervals elsewhere, and recording, moreover, by the

number of the dashes an indication of the time occupied in the operation.

By employing a stereoscopic camera, Gilbreth was able to see the photographed movement in three dimensions. This further refinement in representation gives us the *stereochronocyclegraph*. By the utilization of the cinematographic camera in addition to the former devices for the purpose of securing a series of photographs of successive stages of a movement, we are able afterwards to reproduce on a screen the movement which we wish to study.¹

It still remained, however, for a method to be discovered by which Gilbreth could represent the direction of the movement under observation. This was effected by arranging the voltage and the amperage of the lamp current in such a way that quick incandescence was combined with slow disappearance, so that the flashes of light appeared in the photograph as arrow-headed in shape, broad, that is, at their origin and pointed where the light ceased, thus indicating by their appearance the forward path of the movement.

Two further improvements introduced completed the record for measurement purposes. The actual *length* of the movements needed to be shown, and this was made possible by the use of a "penetrating" screen in the photograph. The same plates on which the final photographs appeared were given a preliminary short exposure, during which a black screen with white squares of standard size was set up in the field where the movements were to be photographed. This screen appeared in the finished picture, and so the movements could be measured by reference to the squares. Usually, to ensure

¹ To-day the *ultra-rapid* camera promises to be of great use in this connection, by taking a large number of photographs per second, say one hundred, for later reproduction at the rate of about fifteen per second (a rate which gives the illusion of continuous movement). In this way we can see actions performed at a *very slow* rate. Thus an action which usually lasts fifteen seconds can be slowed down in representation so that it occupies one hundred seconds.

greater accuracy, photographs were taken from more than one angle.

The more efficient a series of movements is, from the Gilbreth point of view, the more their paths will approximate when photographed to that of a single line ; inefficiency is shown by blurs and tangles and uncertainties.

Finally, in the cinematographic work the introduction into the field of a *microchronometer* showing time correct to the thousandth part of a minute made the device complete and thoroughly scientific.

From the stereochronocyclegraph a wire model can be made of such movements as have been chosen for study or for patterns of efficiency.

Motion models are made by looking at the path as shown in the stereoscope, and bending the wire to conform to this path. The wire model, when completed, is placed in a black box cross-sectioned in white, the cross-sectioning being placed at the same relative places as are the cross-sectioned screens in the original picture.¹

To the worker himself such a permanent record is an eloquent evidence of the quality of his skill or lack of skill, grace or awkwardness, decision or lack of decision.

Many interesting facts came to light when Gilbreth made a study of his motion-models. He discovered that workers not only do not all use the same motions, but that individually they do not use the same methods or trace the same paths in space in working slowly as they do in working quickly. This is because centrifugal force, physical momentum and other factors play a greater part in the latter process than they do in the former. Even the expert teacher, in teaching skilled movements, e.g. those of dancing, typewriting, rowing, violin-playing, etc., does not teach the movements which he himself uses when unconscious of his art, as he will be at his best. Gilbreth considers, therefore, that it is wrong to aim *primarily* at performing the movements to be learnt *slowly* but with accuracy, and then trust to subsequent

¹ *Applied Motion Study*, p. 89.

practice for the development of speed. He believes strongly in the apprentice or the novice plunging into the full current of activity, and acquiring the standard speed at once. This is an economy, since the wrong habits of slow movement have *not* to be unlearned: quality will come by the gradual elimination of unnecessary movements due to faulty adaptation. In fact, Gilbreth's argument is that since those motions with their corresponding speeds are taken as standards which produce the best quality of work, then by using from the outset the standard motions at the standard speed we *must* invariably and inevitably ensure the production of the standard quality.¹

Gilbreth's discovery here is in harmony with much of our modern experience in other educational fields. He has illustrated in an unexpected and striking manner the general truth that when we learn naturally, whether it is to dance, or to speak a new language, or to skate, or adopt new habits, it is by an inner sympathy with, and intuitive grasp of the meaning of the whole process before us, which we imitate first as a whole. Only gradually we learn to split it up consciously into "parts," and generally after we have made considerable progress. To teach a knowledge of the *parts* first, by fixing consciousness separately and rigidly upon them, and to hope that the whole may eventually be built up out of the parts, is to confess complete disbelief in natural methods of learning. Further investigation into this matter, however, is needed.

We do not think, however, that Gilbreth has sufficiently proved the fact that there is only one ideal method of making the movements involved in the performance of a task, and this seems to follow from his emphasis of a *standard* speed and a *standard* motion for all workers engaged in the same task. It would seem that unless the physical and mental structure of individuals were exactly the same in all respects that each standard must be relative, and therefore subject to deviations and modi-

¹ This, of course, is not always possible, e.g. in working with delicate glass and other expensive materials.

fications to suit the peculiarities of the worker who uses them. If Gilbreth insists on a single mechanical standard, then surely he will re-establish in another form the very thing he has been so indefatigable in preventing, the subordination of the human to the mechanical. Man must become the master of mechanism : in that way only can life develop.

Hoxie¹ quotes an interesting example of the breakdown of the method when applied to the work of some seamstresses. Experiments were conducted with different lengths of cut thread to find the optimum thread length ; experiments were conducted with girls of varying arm-length to find an optimum arm-length ; experiments were conducted with different types of motion for the actions of the fingers and arm in sewing. All the experiments proved ineffective. In this case apparently each individual had naturally adopted a method which could not be improved upon : there was no standard method or means which could be profitably adopted universally. So two men may be set to make bushes, and they may use the same callipers as set by an expert workman. The bush in one case will fit perfectly the boss of the wheel for which it is made ; in the other case the boss will be split. The difference is wholly due to the different delicacy in the sensitiveness of the fingers using the callipers, and this sensitiveness cannot be standardized.

It has been said that motion-study is no affair of the psychologist. But to teach motion-study without any attempt to discover how the thing feels to the worker "from the inside" is to court failure. In this country, at any rate, the best policy for some time will be to teach the principles of the subject and leave it to the worker, while encouraging but not inciting him unwisely, to apply them in his own way.

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¹ *Scientific Management and Labour*.

EXAMPLE OF MOTION STUDY PHOTOGRAPHS TAKEN IN THE
DEPARTMENT OF INDUSTRIAL ADMINISTRATION, COLLEGE OF
TECHNOLOGY, MANCHESTER.

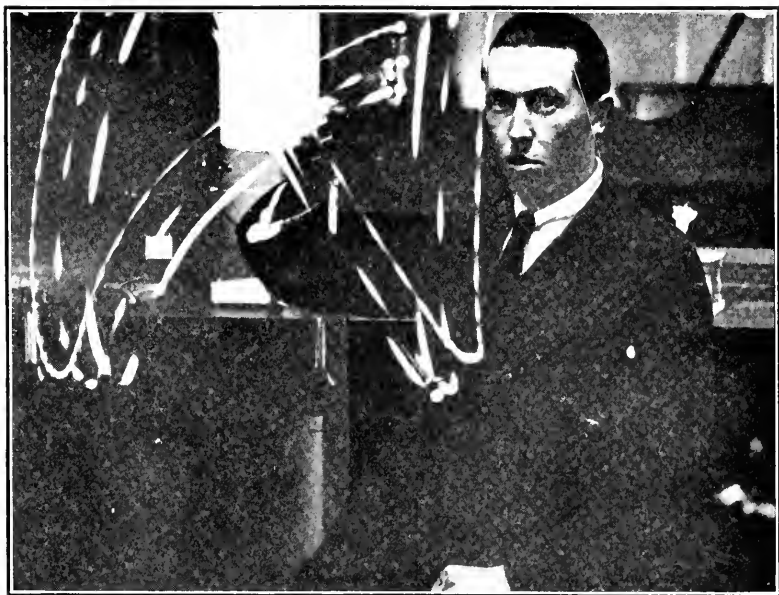
(Reproduced by permission of Dr. A. F. Stanley Kent.)

A photograph illustrating—

1. The method of timing the motion by interrupting the circuit at known rates.
2. The pointers which give the direction in which the motion takes place.
3. A method of differentiating between two or more motion paths.

Three paths are shown—

- (a) A path interrupted twenty-five times per second.
 - (b) A path interrupted ten times per second.
 - (c) A path interrupted five times per second.
4. How the examinee may be introduced (if this is required).



To face p. 66.

CHAPTER IV

VOCATIONAL SELECTION

§ 1. THE NEED FOR SYSTEMATIZED SELECTION

ANOTHER cause of industrial inefficiency now faces us. There is a consensus of opinion among those who have had some experience of the working of our industrial system that the methods utilized in filling up vacancies which occur from time to time in both the ranks and in the high offices of the great army of employed persons are far from satisfactory. Employers interested in the perfection of manufacturing methods lived for a while through a period of great hopefulness when the first attempts were being so successfully undertaken to standardize machinery and processes and determine the best possible working conditions which could be established in the factory and the workshop, but we realize now that unless, in addition, we can learn to deal economically with the placement of the human element in industry and employ the individual workers in occupations where they can use their particular abilities most effectively, we shall still find a state of things existing comparable to that which we have when we are running our machinery with insufficient oil, or when we put our best workmen to work in places where they are being continually disturbed by noise and movement.

In addition to the lack of systematized knowledge there have been two factors which have contributed to our slow approach towards efficiency in dealing with the human element in industry. In the first place it is unfortunately

true that few adolescents know either the extent of their own powers or the range of possibilities open to them in the labour market. Impelled by the insurgent emotions of newly-awakened youth, by the desire to earn their own living, and to take a worthy share in the activities and responsibilities of adult life, the boys and girls of our time pour themselves eagerly into the world of industry through every opening which offers itself. Employers have now grown accustomed to this indiscriminating stream of adolescence coming in full flood upon them, but they have never been able to cope with it effectively. The most they have been able to do is to provide temporary channels of passage. In addition, too, to the hot flood of youth ready to run itself out into any and every mould which is available, there has also been, since the Industrial Revolution set in, a permanent surplus in the adult labour market. For these two reasons it has, therefore, been possible for management to dispense with an accurate knowledge of what constitutes psychological fitness for any given task, and to exercise a certain rough-and-ready choice among those seeking employment, for when this choice has proved to be bad, it has always been possible to replace the least capable workers by those who were likely to shape better.

What has been the customary method of selecting workers in so far as there has been any method at all? Management has had to follow one of two courses : either trust to individual records of fitness, such as testimonials and other paper qualifications, which are notoriously unreliable, and to the impressions of the personal interview ; or to "hire and fire," as the Americans say, that is, engage more workers than are actually required with the idea of weeding out at the end of a short probationary period those who have shown themselves most inefficient. This practice involves a large turnover, and a large labour turnover is to-day rightly considered to be the index of bad management. For this reason, and because even in these circumstances there still remains evidence of

faulty adaptation on every hand, the necessity of economy has been forced upon the consideration of all those who are responsible for the control of industry.

The search for the general principles which should enable men to find their natural occupations or vocations with the least discomfort has been a long one, and it is only to-day that we are even within sight of a scientific mode of procedure. In the pre-scientific period, however, one might have consulted the astrologist, the phrenologist, the physiognomist, and others who claimed to base their forecasts of vocational ability upon general principles. But these pseudo-scientists have developed "hit-or-miss" methods which have not been productive of much real success. If we believe that, for example, the quality of our intelligence and character is determined not only by factors for which our heredity is responsible, but also by the physical and social environment in which we are reared—and this is the generally accepted belief—then it must seem to be mere folly to foretell aptitudes and powers solely from data supplied by the position of the stars at one's birth, or from the contours of one's skull, or the natively determined size and shape of one's hand. It may be, of course, that occasionally, as the astrologist affirms, those born in February will have good taste, be quick at absorbing information, show marked intuition, be intolerant and subject to rheumatism, and so on; but no one will have confidence in any method which pretends to scientific accuracy if it follows this rigid Calvinistic line of reasoning as an infallible guide. Similarly it is impossible to diagnose capacity of brain from quantity or the externally apparent disposition of substance. The same quantity may be poorly or highly convoluted, and this difference may have great significance, just as the difference in the surface area of the pole-plates of two accumulators may be responsible for a difference in their capacities, although in both cases the quantity of metal in the pole-plates themselves may be the same.

The physiognomist, too, has met with a fair amount of

success in diagnosing character. It is impossible to resist the temptation to read something of the character of people in the shifting eye, the massive jaw, the receding chin, the curved shoulder, the vacant stare, the thin or loose lips, and other such features. When there is in addition a play of emotion over the face, then the experienced student of human nature usually gets a good clue to the inner quality of the individual under notice.

There would, then, seem to be enough evidence to warrant us in saying that the success of all such methods as we have just indicated must be due either to chance or to the skill of the man employing them (which, of course, may be considerable) and not to the methods themselves.

Now, an interviewer proceeding by pure chance should be able to score on an average fifty right decisions out of a hundred as to whether individuals are fitted for a particular occupation or not, while his knowledge of human nature gained through experience should be such as to enable him to add another fifteen per cent. to this score. Indications exist, however, that still greater success may be obtained if the trained observer calls to his aid the psychological test to supplement his insight. We must now enquire into this possibility.

§ 2. THE EVOLUTION OF OCCUPATIONAL APTITUDES

It is the tendency in modern industry towards the continuously increasing division of the processes of labour in the mechanical world, and the consequent ever-narrowing specialization of function in the human sphere, which has brought into the sharpest focus, so that it flashes upon the attention of every observing thinker, the problem of finding the fittest workers for each particular task in the myriad-sided work of production and exchange. This two-fold tendency has developed so rapidly within the past century that human nature has lost something of the old equilibrium of its adaptation to the conditions of civilized life. Before the modern age of machinery came in, men and women had, by a process either of mental gravitation or by deliberate selection, found themselves in the occupations and vocations best suited to their intelligence and temperament; and side by side with the gradual perfection of this adaptation on the part of human nature, through individual and racial experience, to the traditional occupations, there went on a steady sifting-out of the temperaments which were markedly unfitted to carry on the industrial traditions of the family or neighbourhood, a process evidenced in such behaviour as running off to sea or to the Colonies. The irrepressible individualism of the Australian, as shown, for example, on many occasions in the recent war, is but one of the many products of this sifting-out process. It may become necessary in this connection to differentiate between *misfits* and *unfits*. The tramp is more frequently

an *unfit* (i.e. defective in intelligence) than a *misfit*. The misfit is a person who finds himself, like W. S. Gilbert's billiard player, condemned to play—

On a cloth untrue, with a twisted cue, and elliptical billiard balls.

In many ways those who have become adapted to their occupations show physical and mental qualities characteristic of their type. As examples of the former we may point to the large hands of the members of farming families and the deft fingers of those of weaving families, and as examples of well-adapted mental dispositions we have the peaceful shepherd type, admirably suited to a life of infrequently interrupted calm, and the hunting type, explosive and irritable, impatient of long control and fond of that change of environment to which the movements of the animals of its prey had accustomed its ancestors.

In their pure form these two latter types no longer exist. It is a speculation of Mr. Edward Carpenter that progress has largely resulted from the appearance and efforts of men who have possessed other "intermediate" types of disposition which are unsuited to those occupations already traditional and common. Thus new dispositions are perhaps blends of more primitive ones. If this should prove a well-founded speculation, then it may yet be possible to construct a branch of the science of industrial psychology which will enable us to account for the comparative popularity of each trade or calling in accordance with the strength of its appeal to the primitive occupational dispositions and their derivatives. We get new tastes, smells, sounds and colours by fusion; why not new mental types? This is no more fanciful than to attempt to account for the more subtle emotions of men by reference to those primary emotions which we have in common with the higher animals; indeed, it may be said that it is but another aspect of the same enterprise. Hunting and shepherding are but expressions of what

Dr. McDougall would perhaps agree to call the instinct of pugnacity and of the tender or protective instinct.

The subject of vocational psychology has not yet been approached from this point of view, but it is obvious that in many occupations an instinctive emotional adaptation is an all-important necessity.

Let us for a moment continue our speculation and try to imagine what may happen to the shepherd—in whom the primary emotions seem to function principally under the control of the protective instinct—as it becomes imperative for him to adapt himself to the changing conditions of life in a progressive community. As his intelligence increases and as society becomes more complex, his native disposition remains fundamentally unchanged; it is still his tendency to brood in tender solicitude over life in its manifold forms, so that every new occupation which he takes up will be but a variation of the original primitive occupation. He will become, according to his new environment, which will make appeals of varying strength to other instincts, the gardener, the breeder, or the doctor, the nurse, the teacher, the priest (shepherd of souls), the welfare worker or the statesman. When his life-powers ebb and his intelligence fails he will still be possessed of the impulse to look after something needing attention, but he will be content, when he cannot care for *animate* creatures, to tend *inanimate* things, so that he may appear in a later civilization as the night-watchman, the railway-porter, the scavenger, or the machine-feeder.

The genealogical tree of the primitive hunter (who is a fisher when his environment is water instead of land) branches out on the enterprising side into the occupations of explorer, pirate and military chief, and on another side into those of the cock-fighter, rat-catcher, bull-fighter, and pugilist. By a process, let us say, of cross fertilization between the shepherd type we have the intermediate types of the missionary, the magistrate and the country squire.

It is generally agreed that there are several other well-

marked primary tendencies, and they, too, will, when they are so well emphasized that they are the *nuclei* around which the remaining tendencies group themselves, show themselves in characteristic occupations. The marked development of the constructive instinct largely determines, according as it is expressed in the mechanical, organic, or human environments, the genius of the engineer and the carpenter, of the breeder and the gardener, and of the organizer, the statesman, the poet and the artist. The instinct of self-display is a strong original factor in motivating the conduct of the actor, the auctioneer, the politician and the labour-leader. The instinct of submission or self-abasement (but the negative form of the previous instinct), and found usually to be present if the herd instincts are strong, is responsible, when it is the only tendency which is well emphasized, for the contentment of the large army of our routine workers. The instinct of curiosity is perhaps more than any other instinct responsible for the persistence of our men of science, our naturalists and even our detectives. Finally, it is the instinct of ownership which perhaps is largely responsible up to a certain point for the commercial activities of men and women. (We speak here figuratively of the instincts: in saying that an instinct functions strongly we mean that personality functions most readily through this instinctive reaction.)

Let the whole of this section be regarded as highly speculative, as indeed it is. There still remains the fact that we all have within us decided native tendencies determining our interests and abilities. Thorndike has published his opinion, based on research, that degree of ability closely correlates with strength of interest, and interest is but another name for instinct viewed from the cognitive aspect, or, let us say, for blends and refinements of instinctive tendencies.

It would be hard (he says), to find any feature of a human being which was a much more permanent fact of his nature than his relative degrees of interest in different lines of thought and action.

Interests are also shown to be symptomatic, to a very great extent, of present and future capacity or ability. Either because one likes what he can do well, or because one gives zeal and effort to what he likes, or because interest and ability are both symptoms of some fundamental feature of the individual's original nature, or because of the combined action of all three of these factors, interest and ability are bound very closely together. The bond is so close that either may be used as a symptom for the other almost as well as for itself.¹

It would seem, then, that the first thing to be done in choosing workers for particular pursuits is to determine whether their instinctive type is the right one for the task. It would be folly to place the man with strong gregarious tendencies in a lighthouse or advise him to go farming in a new colony ; just as it would be folly to advise a girl with a strong motherly instinct to give up her life to mathematics, or the roving type of man to settle down in a very remote country village. In rare cases only would there be enough strength of mind to combat these disturbing factors. In times of stress it is the worker of low-grade intelligence who gives way first. In the higher types of occupation self-control will be essential. But in dealing with workers of the semi-educated type, in which case we cannot be sure of the existence of sentiments or ideals capable of controlling the functioning of crude emotion and instinct for long periods, it is desirable that we should be able to apply a test for the discovery of the relative strength of the primary interests or instincts with a view to effecting a match between occupation and temperament. Whether we shall be able to construct tests for this purpose, the next few years will prove.

¹ *Popular Science Monthly*, 1912.

§ 3. INTELLIGENCE TESTS

In the majority of occupations the principal factor to be considered will usually be what is vaguely called intelligence. Workers of low-grade intelligence tend to drift into the worst-paid occupations, while those of approximately equal intelligence tend to enter similarly paid occupations. Differences on the sensory and motor side of mind are in most callings, other than purely manual occupations, less significant of capacity than differences in intellectual ability. Thus, a person with good reasoning powers and poor sight or hearing will fill a post of responsibility much more effectively than a person of excellent sight and hearing but of poor reasoning powers. In fact, a person with high intellectual ability will make good in most non-manual occupations: it is in a few rather than in the majority of callings that he will fail.

What is intelligence? Stern's definition runs as follows:—

Intelligence is the general capacity of an individual consciously to adjust his thinking to new requirements: it is general mental adaptability to new problems and conditions of life.¹

The virtue of this definition lies in its emphasis of the *creative* aspect of intelligence, but it still contains in it, in the word "thinking," the intellectualistic fallacy. The action of a person in stamping out the flame of a burning piece which has fallen near its feet is none the less intelligent because it is also instinctive. As Dr. Myers said a few years ago in a symposium on the relation of intelligence to instinct, it is possible to demonstrate the

¹ *Psychological Methods of Testing Intelligence.*

power of "learning from experience"; a fundamental mark of intelligence, as low down in the scale of evolution as the ants, at least, so that instinct and intelligence may well be regarded as respectively the objective and subjective aspects of the same thing. At the super-conscious level, one might add, intelligence and intuition are again but different aspects of the same mental process.

The variety, indeed, of the forms in which personality may express itself, in the movements of the fingers, the arms, and the body, no less than in words from the pen or mouth, is almost infinite. It would seem, as we have said elsewhere, that intelligence for a long time explores all the possible avenues to expression and tends to remain content with those by which it can arrive at the greatest satisfaction. A slum environment or a defective education shuts off automatically the entrances to many of these avenues, though the strongest personality may often force the barriers.

The mechanical factors independent of conscious improvement which function in our human complex may be separately tested, and indeed they often have been, but though they are important and may rightly be looked for to play their part in general efficiency, they would seem to weigh less in the effectiveness of the final combination of qualities than the factors of a higher type. Thus a person with greater persistence of interests can often surpass another whose mental *tempo* may be speedier, while a man with great reasoning power, comparatively deficient in persistence and in mechanical quickness, may outwit them both. The fact also that boys or girls are remarkable for routine skill in work involving little comprehension of general principles is no argument for their ability to perform operations involving reasoning ability. It is because of this that intelligence tests which have called for the highest qualities in their performance have proved most successful in use. But so far, skill in co-ordinated movements of the hands or body generally has been neglected in many of our tests, and we have

not sufficiently differentiated between the intelligence which is at home with concrete everyday emergencies and that which prefers the abstract interests, or between the intelligence which is content to follow the beaten track and that which is never happy unless breaking new ground.

As age increases a man's wits may not remain so lively, and yet his intellectual quality may improve; just as he loses in speed of bodily reactions so he may tend to lose in the power of reacting quickly to the demands of such a test as involves speedy decision about matters of fact he may know quite well; and, moreover, because he will find fewer occasions for exercising speed as he exchanges routine operations for tasks of greater responsibility involving careful deliberation: quick reaction to environment is replaced frequently by *deliberation as to whether reaction is worth while*.

But let us accept as a fact of the greatest vocational significance this variation in the *tempo* of intelligence. There seems to be very little doubt that modern life, especially as we see it in towns, where after all the majority of us live, is becoming increasingly suited to those people who possess quickness of mind rather than profundity. We have developed systems of business and industry which promote hustle, methods of travel which preclude the possibility of leisurely thought, games which demand swift movement and instant decision, newspapers and amusements which emphasize only the things which are on the crest of the passing wave, and fashions, attitudes and moods which express nothing but novelty. The most valuable qualities a person can possess, if he must live in this world of quick change of the sort which we have indicated, are speedy thinking and enterprise. The slower type of mind must be content to await the golden moment of opportunity. It is now the hour of precocity: quick to mature and swift to perish are our modern reputations.

The American psychologists who were called in to

assist the Government in its gigantic task of organizing the newly recruited armies under men likely to make capable leaders decided that the paramount quality which a leader should possess in the way of intelligence is the power of rapid and accurate judgment. In emphasizing speed of reaction they acted on the assumption, no doubt, that the ablest men are generally the speediest in forming sound judgments. Such men as were in this way selected were probably the best to be found for manning the lower posts of responsibility, so that we can understand the success of the army psychological tests. As a secondary result of the application of the tests, the principal American trades, occupations and professions were graded in accordance with the average merit shown in the performances. Thus engineer officers did best and labourers worst, a result which we might have anticipated. It is probable, however, that the kind of test used which emphasizes speed in dealing with pencil and paper problems places those engaged in clerical professions at too great an advantage. The best tests for general intelligence will probably take other forms, e.g. those of reasoning tests consisting of concrete problems graded in difficulty and relating to everyday affairs, like those which Mr. Cyril Burt has published.¹

Dr. Goddard² has, we believe, concluded wrongly that the American army tests, which tap but one kind of intelligence, are a fair indication of the mental powers of his countrymen.

As partly, but not completely, representative of the American Army psychological tests we may quote the following. (In every case the examiner times the students and reads the instructions. The work sheets have thus no instructions printed on them.)

1.



Place a cross in the first of the circles and a figure *one* in the third. (*Time, 5 secs. allowed.*)

¹ *Journal of Experimental Pedagogy*, June, 1919.

² See *Human Efficiency and Levels of Intelligence*.

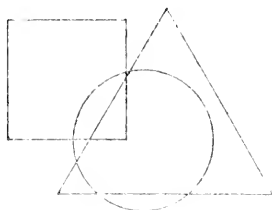
80 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

2.



Draw a line from circle 1 to circle 4, passing above circle 2 and below circle 3. (*Time, 5 secs.*)

3.



- (a) Place a cross in the triangle, but not in the square, and the figure 3 in the square and in the triangle.
- (b) Place a figure 6 in the circle, but not in the triangle or the square.
- (c) Place a figure 2 in the triangle and the circle, but not in the square. (*Time, 10 secs. each.*)

4.



If a rifle can fire more bullets than a machine-gun in a given time, put a cross in the second circle. If not, draw a line under the third. (*Time, 10 secs.*)

5.



Put in the second circle the right number of months in the year and in the fourth any other wrong number. (*Time, 10 secs.*)

6. A B C D E F G H I J K L M N O P

Cross through the second letter and draw a line under the eighth. (*Time, 10 secs.*)

7. 34 - 79 - 56 - 87 - 68 - 25 - 82 - 47

27 - 31 - 64 - 93 - 23 - 31 - 72 - 15

29 - 80 - 32 - 21

Cross through all numbers less than 30 but larger than 20: (*Time, 15 secs.*)

8



Cross through all figures other than squares which contain an even number.

Cross through squares containing an odd number and a letter. (*Time, 25 secs.*)

90055

The principal adverse criticisms which suggest themselves in connection with most of the psychological tests such as these may be briefly summarized :—

1. They over-emphasize the factor of speed in intelligent reaction. While they may be excellent for the diagnosis of ability to fill minor executive positions where promptness and despatch are important, they would rarely reveal an Edison or a Darwin if of slower reaction but of enormously greater intelligence.
2. They place workers who do not follow clerical occupations at a disadvantage.¹ That is, they do not test abilities which are often largely independent of general intellectual ability, so that there are qualities of intelligence which may not find a natural means of expression through these tests.
3. They neglect to take into consideration temperament, specific interests which are not literary or mathematical, and other emotional factors.

In short, to show an inability to score at these tests may not mean that the subject is unintelligent.

Yet though from some points of view the American type of test may appear defective, it must not be supposed that it is without considerable virtue. If such tests over-emphasize speed, it must not be thought that speed is always found together with carelessness. Experimental work suggests very strongly that the presence of one good quality is more likely to involve the presence of other good qualities than not. It is popularly supposed that there is a law of compensation which holds both in the physical and in the mental world. Thus those who are slow are thought to be more reliable than those who are quick ; that those who are good at theory

¹ This objection does not apply to the "form-board" test, ability to do well at which involves the quick recognition of and aptitude to deal with geometrical *forms*.

82 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

are more often than not bad at practice, and that those who learn easily forget quickly. It is probably because of the dramatic character of such incidents as would suggest the truth of this view that we are led to believe in the compensation theory. On the whole, though we have said that such tests as the American Army tests would fail to reveal an Edison or a Darwin, this kind of case will be exceptional.

But the psychological test when perfected will be useful in three distinct ways. In the first place it will

Rank.	Grades of Intelligence, from Very Superior (A) to Very Inferior (E).						
	A	B	C+	C	C-	D	E
8,819 Officers	48.4	34.6	13.8	2.92	0.25	0.01	—
9,240 O.T.C.	36.8	36.4	19.5	6.16	0.98	0.14	—
3,393 Sergts.	20.9	32.5	27.3	14.2	4.05	1.05	—
4,023 Corpls.	13.7	26.0	31.3	20.33	7.33	1.33	—
81,114 Literate privates	6.37	12.38	20.48	28.79	21.48	10.24	0.2
10,803 Illiterate privates	0.52	1.95	4.43	14.67	29.11	41.16	7.8

From *The Psychological Bulletin* XV. 183.

eliminate personal bias; for example, it is difficult to escape belief that good education, or good dress, or good manners, or fluency of speech, or positiveness of statement, or determination in one way or another, or all these things together, are not proportionate to the amount of intelligence of the person in whom they appear. In addition, the psychologist is often able to provide us with standards or forms calculated from the performance of many thousands of subjects, so that the performance of any fresh subject can be readily compared with the

average performance. Moreover, the application of the psychological test saves time. One can find out in an hour what the careful observer has only found out through the experience of months or years. In the table on p. 82 we have represented the test performances of over 124,000 American soldiers who in this case had found their level in the Army after much effort and time. It will be seen that their performances in the tests suggest that they could practically have been placed right away into the positions they had gained. Certain exceptions would appear, but we must remember that the tests used only revealed intellectual ability and not such character qualities as are only vaguely known to be connected with them.

THE CONSTRUCTION OF TESTS.

There are two precautions which should be observed by those who think of applying psychological tests for the determination of vocational fitness. In the first place it should be understood that a single psychological test may reveal little that is completely reliable about a person's abilities, so that a series of such tests systematically planned to cover as many of the varied manifestations of human character and intelligence as possible should be employed. In the second place, there is always the probability that the untrained investigator will stumble into every one of the pits which beset the path of the scientific investigator.

We may construct psychological tests of vocational aptitudes in two ways. First, we may take the work for which we intend to diagnose fitness and analyse it so that we can find the elementary qualities involved; then we shall be able to test the efficiency of subjects in each separate quality; we may call this method provisionally the analytic method. Or we may, as before, analyse out the elementary qualities involved and then construct a test which necessitates their all functioning in much the same proportion as in the actual task; this is the *analogous* or *synthetic* method.

The two methods must obviously depend for their success upon the correct isolation of the separate factors involved in a particular kind of mental activity, and some people may object with good reason that such attempts at isolation lead to the construction of artificial abstractions which are in no way related to the facts. For example, most of the popularly supposed mental elements, such as observation, imagination, attention, memory, and so on, are anything but elementary.

As an illustration of the analogous method of constructing psychological tests, we may quote the classic test which Professor Münsterberg invented for the purpose of diagnosing what may be called "car-driving" ability. He gauged the ability of intending "motor men" to take up car-driving by their efficiency in detecting quickly and reacting adequately to certain significant figures printed on a card over which, as they turned a handle, a travelling band passed with a slit in it. The slit moved in a straight line revealing a few of the figures at a time. Along the centre of the track of the slit the car might be considered to be travelling, and by manipulation of the handle the pace could be controlled by the operator. On each side of the line of the car's advance there were to be seen figures in two colours, those in one colour representing passengers on foot, horse-drawn vehicles, and automobiles which were moving parallel to the track, and those in the other colour representing the same classes of persons and things moving across the track. The positions of these latter figures relative to the track either denoted or else did not denote the fact that they were supposed to arrive on the track at the same moment as the rear edge of the moving slit, and this would or would not mean that an accident-situation had arisen. The subject's ability to detect quickly accident-situations could accordingly be estimated. Münsterberg said that the trained motor men who were sent to him for trial tests could be sorted out by means of this test and graded in very much the same order as that in which they stood

with respect to actual trade ability. In this second type of test, however, one cannot be absolutely sure that one is not testing what may be called general intelligence rather than that specific form of it which is demanded in car-driving.¹

Having decided upon psychological tests which we may consider to be suitable for use in a particular case, the next thing to do is to discover to what extent these tests are reliable. This is an important stage in their use. The reliability of a test is investigated, as a rule, through a comparison of the grading into which it sorts out a number of subjects with the grading earned for their ability in the actual work. Suppose that we decide that five persons can be graded by the decision of two independent judges with respect to their salesmanship in the order : A, B, C, D, E. As a result of the grading by psychological tests, the order may conceivably be :

(1)	A,	B,	C,	D,	E ;
(2)	E,	D,	C,	B,	A ;
(3)	C,	B,	E,	D,	A ; or
(4)	B,	A,	D,	E,	C.

In these simple examples we can see at once how closely the results correspond to the actual facts. By the use of a mathematical formula we can get a measure of the extent of the correspondence of the test order with the trade order when it is not so apparent from an inspection. This formula, called the correlation formula, is usually written (the Spearman form) as—

$$r = 1 - \frac{6 \times \text{sum } (d^2)}{n(n^2 - 1)}$$

where d is the difference in the rank order of each particular individual tested, and n the number of individuals, r being the symbol of correlation.

¹ See criticism of this test by Mr. Cyril Burt in *Lectures on Industrial Administration* (Pitman).

86 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

In the above cases the use of the formula would give the following results:—

CASE 1.

There is obviously complete correspondence, in which case the formula becomes

$$r = 1 - \frac{6 \times 0}{n(n^2 - 1)} = 1 - 0 = +1$$

CASE 2.

Estimated Rank.	Test Rank.	d.	d ² .
A	E	4	16
B	D	2	4
C	C	0	0
D	B	2	4
E	A	4	16
			—
			Sum = 40

$$\begin{aligned}
 r &= 1 - \frac{6 \cdot 40}{5 \cdot 24} \\
 &= -1 \\
 &= \text{complete inverse correlation.}
 \end{aligned}$$

CASE 3.

Estimated Rank.	Test Rank.	d.	d ² .
A	C	2	1
B	B	0	9
C	E	2	4
D	D	0	0
E	A	4	4
			—
			Sum = 18

$$\begin{aligned}
 r &= 1 - \frac{6 \cdot 18}{5 \cdot 24} \\
 &= \frac{12}{120} = \frac{1}{10} \\
 &= +0.1 \\
 &= (\text{practically}) \text{ absence of correlation}
 \end{aligned}$$

CASE 4.

Estimated Rank.	Test Rank.	d.	d ² .
A	B	1	1
B	A	1	1
C	D	1	1
D	E	1	1
E	C	2	4

Sum = 8

$$\begin{aligned}
 r &= 1 - \frac{6.8}{5.24} \\
 &= +0.6 \\
 &= \text{fairly high correlation.}
 \end{aligned}$$

A test which is satisfactory should give a correlation of +0.6 or upwards. Complete correspondence is rarely found because of the presence of elusive factors which are apparently responsible for small errors functioning in both the test and the construction of the trade ability estimate. Thus we have frequently found that instructors and foremen are unable to judge their workers by their *trade ability alone*. Another measure usually employed which provides a further check upon the reliability of our tests is called the *probable error*. When this is comparatively large we should suspect the general validity of our results. Readers will find in the text-books of experimental psychology all the particulars of mental measurement necessary in this connection.

The strategic objection, then, to make to the psychologist who claims to be able to grade workers by their ability, should take the concrete form of a challenge to him to grade correctly, by means of his tests, five or six workers whose trade rank or intelligence has been agreed upon by at least two independent judges capable of estimating their ability.

When the American psychologists were faced in the war with the task of filling up the technical units of the army with the men best qualified for service in them, they proceeded with their task in the following manner.

They conceived their problem to be divisible into four stages :

1. To construct a tentative list of "trade" questions and a tentative practical task.
2. To try these questions and the task on men of the specified trade with different degrees of ability.
3. To revise the tests in the light of experience gained.
4. To try out the tests once again on eighty men chosen as follows :—

Twenty men to be experts in the specified trade,
 Twenty men to be of ordinary skill,
 Twenty men to be apprentices,
 Twenty men to be novices ; and

5. To make further revision of the test in light of new experience.

These trade tests were successful to the following extent in showing individual differences. On an average they placed 6 per cent. men tested as expert, 24 per cent. as "journeymen," 40 per cent. as apprentices, and 30 per cent. as novices, while in their use with men of known capacity they correlated very highly with results based on known capacity.

This points, then, to the procedure to be adopted in constructing a psychological test for fitness for a given piece of work.

1. First analyse the work.
2. Choose the chief capacities involved.
3. Arrange a series of tests for the chief capacities or construct a single test involving them all.
4. Try out these tests upon a number of subjects (e.g., 30) employed on the work analysed and see that representatives of excellent, fair and poor workers are all experimented on.

5. Get a *trade ability* arrangement of these workers.
6. Choose for your standard test that of which the results correlate most highly (above $+0.6$) with the trade ability arrangement of the subjects of your experiments.

We may say here by way of conclusion to this section that we believe experience will point to the advisability of each industry developing its own types of intelligence test. Thus the intelligence test devised in order to reveal "fitting" ability will be one embodying a task which appeals to the constructive engineering interest of the fitter (his love of making things *work*), as well as to his intellectual powers and manipulative skill. The tendency to suppose that any other kind of test—for example, a language test—may reveal an aptitude and an ability so specific is probably unsound. Thus Münsterberg's test for tram-drivers was excellent up to a certain point, but because it did not appeal to an interest in cars and streets, all the university graduates who worked the test were able to show better results than the best drivers. Herein, then, lay the defect of an otherwise excellent test.

§ 4. VOCATIONAL PSYCHOLOGY

What we have attempted to do so far is to illustrate the psychological method of attack upon the problem of Vocational Selection. This problem involves, in the first place, an analysis of abilities and aptitudes and the construction of tests for their diagnosis; and, in the second place, an analysis of interests and the construction of tests for them.

The work of determining the qualities required in an occupation or calling is often called *vocational psychology*; the list of qualities itself is usually spoken of as a *vocational psychograph*. Professor Seashore, for example, has elaborated in great detail the *psychograph* of a singer, and mentions such abilities as keen pitch, rhythm and *timbre* discrimination, good auditory imagery, long auditory memory span, big range of voice, ability to sing in tune and in time, steady control of breath, sensitiveness to emotional expression, marked creative imagination, etc. The difficulty in testing for each of these qualities *separately* is (1) to be sure that you are isolating them; and (2) to know what relative value they possess in the total psychograph.

It has been our point that intelligence cannot be divorced from character, and the tests which are given upon the assumption that the two are separate will fail. Intelligence itself is an extraordinarily complex thing. It varies in quality as well as in quantity. It is affected in its manifestations largely by the environment as well as by heredity. Suppose, for example, it is discovered that a subject has marked ability or interest in construction,

then the way in which this ability or interest finds a way out into expression will depend particularly on the home, the school and the social circle in which he has been brought up. But it will also depend on native factors beyond our power of modifying very largely. Whether the subject will use his interest and ability in construction as an inventor, an engineer, a sculptor, a carpenter, a dramatist, an artist, or a statesman, will depend upon the presence or absence of such native factors as physical strength, sensitiveness of fingers, dexterity in the use of hands, language ability, colour sense, musical ability, and so on. For example, if the subject lacks sensitiveness of fingers or dexterity in the use of his hands—things not easily cultivated when almost absent or extremely poor—he will never make a carpenter, an engineer, or a sculptor. If he has no language ability, he will never become a dramatist. If he is colour blind, or has a poor colour sense, he will never make a great painter, but he may become a successful sculptor.

Intelligence, in addition, then, to functioning through what we may loosely call here intellectual ability, functions also through several other more or less independent specific forms. It would seem as though our mental energy is able to flow more easily in one channel of expression than in another, just as we find it possible to achieve greater and more delicate self-expression through one hand than through the other (so that ambidexterity is the exception rather than the rule). Extremely great routine skill is possible through the development of specific abilities apart from that of the general intelligence. Our factories teem with adolescents who find few other outlets for intelligence in their work except it be through motor dexterity.

Motor dexterity is a well-established specific ability. In the schools we find many children who excel in a marked manner in handwork occupations, in drawing, penmanship, painting, modelling, needlework, and games involving hand and eye co-ordination, who are not always the best

children in point of all-round ability. Precision and speed of movement on a large or a small scale is an essential aptitude for many occupations, and a test of ability in such movement is urgently necessary. A test which contains possibilities is the Pegging Board Test.¹ It consists of a board about 2 feet square divided into 625 smaller squares, each of which contains a hole. Into these holes pegs may be placed. A simple test of speed would be to measure the time taken in pegging a square of 100 holes. Better tests, because they involve the use of a larger measure of general intelligence, would be tests calling for the speedy imitation of a peg-pattern of some complexity, or the making of a pattern in accordance with verbal or written instructions. The imitation on the right side of the board of a pattern made on the left is usually sufficiently difficult to bring out significant individual differences. Motor dexterity is the mechanical basis for scientific and artistic skill, and it may be that if we can construct good tests for motor dexterity varying with each industry, then a knowledge of a subject's interests and of the quality of his intellectual powers will in addition give us as good grounds for an estimate of his scientific or artistic skill as we can at present hope to get.

It is generally assumed that mathematical ability is specific. In vocational practice there is little need to test mathematical ability, but it will be frequently necessary to test calculating ability (by some investigators taken to be distinct from mathematical ability, though itself specific). According to the results of investigations, ability in calculating is best evidenced in the first minute of a series of several minutes' work. Thus Phillips² found that the performance of pupils who added continuously for ten minutes was better by 6 per cent. to 12 per cent. in first minute than in any subsequent

¹ This test will be found described in *Choosing Employees by Test*. By W. F. Kemble.

² *Journal of Educational Psychology*, 1916.

minute. Chapman and Nolan¹ found practically the same thing; the average performance of the first half minute exceeded the average work in the remaining nineteen half minutes by 29 per cent.

To test calculating ability we need, therefore, do nothing more than arrange for a test such as the following:

On the back of this page you will find several columns of figures. At the signal "Begin," turn over and add up the figures in each column as quickly as possible. At the end of one minute you will be told to stop.

Back.

8	6	2	9	3	7	4	1	5	8	5	9	6	7	5
3	1	6	7	2	2	8	5	9	3	7	1	3	9	9
7	4	5	4	9	5	2	8	3	7	9	7	9	8	2
8	7	3	1	4	8	5	2	6	9	4	8	1	3	7
2	2	7	6	7	3	9	6	1	4	3	4	8	2	3
6	5	9	3	1	6	3	9	4	6	6	3	6	6	4
4	8	4	2	5	9	6	3	7	1	7	8	5	4	1
5	3	8	5	8	4	1	7	2	5	8	5	9	8	8
1	6	1	8	4	7	4	1	5	6	9	2	7	9	6
7	9	5	3	6	1	7	4	8	2	1	7	2	3	7

The performance in a test of this kind will depend to some extent on previous training. Subjects who have been doing office work will add on an average eight columns while others will average four.

A third specific ability is language ability. Mr. Cyril Burt would differentiate between linguistic ability and literary ability, which, in addition to the power of understanding and using skilfully the mother tongue, seems to involve æsthetic appreciation of language as a means of self-expression. Language ability is apparently, therefore, the basis fundamental to literary ability. It is an essential factor in the intelligence of the secretary-

¹ *American Journal of Psychology*, 1916.

clerk and the journalist. A test suitable for diagnosing the linguistic ability of journalists which we have found useful is the following :—

Look carefully at each word in capitals in the following list, and notice the meanings put opposite to each. One or more of these meanings may be correct, but ALL may be incorrect. Place a tick under each correct meaning and cross out all false meanings.

ABEYANCE .	. state of suspension ; grounds of an abbey.
ACETIC .	. disdainful of pleasures ; a hard strict kind of life.
ADUMBRATE .	. to sound faintly ; to shadow forth.
ADVENTITIOUS .	. accidental ; full of risk ; belonging to advent.
AGONISTIC .	. athletic ; full of agony.
ALLUSORY .	. deceptive ; attractive.
ANAGRAM .	. a whole gram ; a wireless message ; a kind of diagram.
APTEROUS .	. having wings ; very apt.
ARTESIAN .	. a workman ; a skilled workman.
BASTINADO .	. an earthwork ; a form of punishment.
BUZZARD .	. a buzzing bee ; a species of linnet.
CALENDER .	. a machine for pressing ; a register of days, weeks, months, etc.
CALIBRE .	. mental capacity ; diameter of a hollow tube.
CONGERIES .	. large sea-eels ; a mass of particles.
ELIGIBLE .	. not easy to read ; easy to read.
EMPIRIC .	. known by experience ; belonging to an empire.
EPHEMERAL .	. not manly ; lasting for a short time.
FERMENTATION .	. lathing with warm water ; stirring with anger ; chemical change.
FIGMENT .	. composed of figs ; an invention.
FORMIC .	. according to form ; derived from ants.
FRIABLE .	. able to be fried ; apt to crumble.
GEMINATE .	. act of budding ; to sprout ; act of doubling.

HEBDOMADAL	. connected with the stomach ; occurring weekly.
HERMETIC	. magical ; belonging to the hermit.
HIBERNIZATION	. becoming Irish ; act of passing the winter in sleep.
HYSTERESIS	. a magnetic phenomenon ; state of hysteria.
INTERMEZZO	. a voice between soprano and alto in quality ; an interlude.
LENTOID	. belonging to Lent ; shaped like a lens ; a kind of lentil.
LITTORAL	. the sea-shore ; plain in meaning ; according to the letter.
MERETRICIOUS	. full of merit ; gaudy and deceitful.
METRONYMIC	. a name derived from one's mother ; measured by a metronome.
NOSOLOGY	. science of noses ; science of diseases.
OBFUSCATE	. to smell badly ; to darken.
OBSECRATE	. to curse ; to treat shamefully ; to beseech, implore.
OCELLATE	. to vibrate ; to move in suspension.
PASTEURIZE	. to sterilize ; to put out to grass.
PERPETRATE	. to make last for a long time ; to make last for ever.
PHILTER	. to strain through a sieve ; a charm to awaken love.
PROSCRIBE	. to give directions for—as a remedy ; to publish names of persons to be punished.
PROTEAN	. an element in foods ; variable.
RESPECTIVELY	. with becoming respect ; full of respect.
RETORT	. a sharp reply ; a vessel used in distillation.
SANDALWOOD	. wood used in France for making wooden shoes ; a sweet-smelling wood.
SATYRICAL	. sarcastic ; abusive ; scornful ; part-man, part-goat.
SUMPTUARY	. costly ; magnificent ; a mule for carrying burdens.

TAXIDERMIST	. a man who makes taximeters; one who stuffs skins of animals.
TRUCULENT	. flowing easily; fierce and cruel; boastful.
UNAPPRIZED	. without a prize; uninformed.
VIRAGO	. a kind of bird; a disease; giddiness.
VITREOUS	. glassy; belonging to a very powerful acid.

A case has been made, and we think with success, by Dr. N. McQueen¹ for the existence of specific forms of attention ability, especially of the ability to *distribute* attention in a definite way. There have been distinctions noted in the past between the fixating and fluctuating types of attention. The distributive mind can fixate or fluctuate at will in some particular direction. McQueen found no correlation between general intelligence and the power to distribute attention. In some occupations the ability to distribute attention is of great importance, for example in 'bus driving and telephone operating. It is essential, too, in organization and administration. Münsterberg's Test for Motormen is an example of a test which may be used for diagnosing one type of this ability, while another excellent test is the test in Whipple's *Manual of Physical and Mental Tests* used for illustrating *simultaneous disparate activities*. It involves the finding and placing out of the letters of an alphabet with one hand while the other is being employed in placing rings on an upright metal pillar.

* * * * *

In conclusion we would say here that the fact that certain mechanical aptitudes are essential to the development of skill in any occupation does not mean that we should overlook the equally important fact that *interest* and *intelligence* are needed to sustain them in working efficiency. The opinion most popular at the moment is that there is a place in the industrial mechanism where each of us should naturally be fitted, and that once there

¹ *The Distribution of Intelligence* (*Brit. Jour. Psych. Monograph*, No 5).

we shall find that all will be for the best in the best of all possible worlds. It is to be feared, however, that the social mechanism into which some reformers would have us fit ourselves will be no more than a mechanism, rigid and static. Life, however, can never be confined within moulds or fetters, so that the industrial system which is to secure man's lasting support must allow him growing room.¹ In short, there must be provided outlets for initiative accessible to all, or vocational selection may be rightly suspected as a sinister method of stereotyping status in the industrial world.

¹ The writer is engaged on a fuller treatment of the subject of vocational selection to be published shortly in book form.

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CHAPTER V

SCIENTIFIC MANAGEMENT AND LABOUR

§ 1. TAYLORISM : FIRST PHASE

ATTENTION to the worker's needs will enable us to eliminate a considerable amount of unnecessary unrest, but not all. There seems reason to believe that much mental dissatisfaction may remain even when working methods are perfect. Can we root out the worst forms of fatigue and solve our industrial problems by a more complete re-organization of our industrial life? The consideration of this question is a psychological necessity. Now, scientific management aims at the thorough-going re-organization of industry in the interests of the greatest possible efficiency. It is often assumed that scientific management is a device of employers for getting the last ounce of effort out of labour, but labour in control of industry might, however, adopt scientific management equally well as an easy and pleasant way of securing its own well-defined ends. It is, therefore, worthy of the best attention of those who are interested not only in the elimination of fatigue from industry, but also in the spread of the means of civilization and culture. It is a system which will depend just as much, of course, as the traditional systems for its success upon a sound knowledge of finance and markets and upon an intimate acquaintance with the results of modern research in the physical sciences. With these factors of scientific management we are not directly concerned. But scientific management, if it is to live up to its high-sounding name,

must also include the economic regulation and control of the human element in industry. Yet it is usually agreed that most of the attempts which have so far been made to introduce scientific management into industry have been characterized by an insufficient consideration of this important factor in production. Scientific management, in short, has not been scientific enough: in fact, it has been neither sound science nor good management. Our justification for including in this book an account of scientific management, or Taylorism, as it is often called, is that in it we have in clear colour and outline an admirable picture of all that organized labour *fears*. And since the relations which exist between those who organize industry and the workers who serve them demand psychological study, we may very well choose the scientific management movement as an introductory study ground in our attempt to explore these relations. Recognizing that an increasingly greater output in the necessities of life must ultimately be for the benefit of all, and that, consequently, the scientific mechanization and speeding-up of industry are fundamentally necessary and natural tendencies of our time which it is futile to oppose, but realizing too, that after all, production is as much for the sake of life, as life for the sake of production, we must endeavour to keep our view at once clear, steady and impartial. We must realize, moreover, that the continuous mechanical improvement in the methods of work on the one hand, and the spirit of inventiveness and initiative (the *will-to-achieve*) on the other, are things of which we cannot have too much; they are the indispensable weft and warp of the complex fabric of our civilization. Without modern large-scale industry, that is to say, the structure of present-day culture and civilization would fall to pieces.

Yet parallel with the progress in the replacement of manual power and local trade by machinery and world-wide competitive commerce there has developed a spiritual revolt among the manual workers against the conditions

into which machine progress has landed them. The opposition of labour to these tendencies of our age is largely motivated, as we have said, by fear springing primarily from the feeling of insecurity, and liable, consequently, to result in misunderstandings, and to express itself blindly, as often as not, in anger and revolt. We may in one sense speak of the existence to-day of a dissociation of the "social mind" which, lacking a single purpose approved by all, has split through conflict into two parts, with apparently irreconcilable aims. Whereas management is concerned principally in increasing and cheapening production, labour is mostly concerned in increasing the welfare of those who actively participate in it. Obviously there is no predestined inescapable conflict between these two tendencies. Yet antagonism seems inevitable, simply through difference in habitual outlook of employer and employee. All the elements of antagonism between management and labour have seemed in the past, however, to crystallize about negotiable matters capable of settlement; for example, about the division of the material benefits which accrue from industry. The real opposition of labour to management does not revolve about the *value* of the present industrial system. Even if labour were given sole charge of industry to-morrow, progress could only be maintained by an increased adoption of scientific methods of work. Europe has recently afforded us an example. The dictatorship of the manual labourer in Russia unsupported by the technicians and financiers who are the pivots of modern trade and commerce resulted in the disorganization of production, and Lenin himself has admitted his error in dispensing in his revolution with the aid of the managerial classes. The industrial conscription introduced by the Soviets, partly to make good this error, would have rejoiced the heart of the most unregenerate Taylorist. It is interesting, therefore to learn that Lenin has himself written with great appreciation of "Taylorism" in the Moscow press.

It would seem indisputable to-day that those nations

which, whether democratic or autocratic in constitution, do not accept to the full the implications of enlightened scientific management will simply be offering themselves as an economic sacrifice to their more enterprising neighbours. Instead, therefore, of a policy of blind opposition to every new device of scientific production, labour should concentrate on the policy of making large-scale industry the instrument not only of material prosperity, but also of its complete enfranchisement and development.

We have spoken of scientific management as the organization of industry in the interests of efficiency. Labour, then, must see that in this meaning human efficiency is included as well as efficiency in the material and mechanical sense. The best production can only exist when methods are employed which necessitate the effective employment of the *total* personality of the worker. It is human waste and a confession of failure on the part of management to allow any part of the current of the worker's activity to run idle: his wonderfully strong and delicate mechanism must be kept in good running order; his intelligent interest must as far as possible be aroused; the springs of his driving power, the passions, must be stirred into activity; and whatever creative and artistic abilities he possesses enlisted in his work. Of these powers and abilities only the first can be commanded to any extent; the others when they exist must be evoked by suitable appeals.

Labour's policy must not, therefore, conflict with that of wise management: it is really complementary to it. Each has something valuable to contribute to the development of industry; each without the other is apt to run into blind alleys, but each with the other is capable of infinite invention and service. There is a distinct danger, for example, of the engineer-employer who thoroughly understands the *mechanics* of production becoming so intent upon his own particular science as to lose sight of all wider interests; just as there is a danger of the well-intentioned reformer who is ignorant

of the technical aspects of industry interfering unwisely with methods of production through misdirected zeal. But with a steady growth of scientific knowledge and a wise nourishment of the human interests of the workers we ought more surely to move forward uninterruptedly to whatever goals we choose to seek.

Since the term "Scientific Management" has only quite recently come into general use, it may be useful to give an account of its origin. Drury in his account of the scientific management movement¹ dates the use of the term from 1910. In that year there was a judicial inquiry into the justice of the proposal on the part of some of the U.S.A. railways to advance their rates. One of the attorneys, Justice Brandeis, took the offensive against the railway magnates in suggesting that by thought and care they could so economize in their working costs as to render the new rates unnecessary. To the plea that the rates were due to high labour charges, he said in reply that there was a system of economizing in labour charges which actually depended on the payment of a high rate of wages. "This system which meant high wages and low labour cost he called *scientific management*."²

We have already spoken in some detail of the work of Dr. F. W. Taylor, the originator of scientific management in its original form, in connection with the handling of pig-iron at the Bethlehem Steel Works. It should be understood that Taylor's system, often called Taylorism, is not the only historical form of scientific management. Mr. Harrington Emerson, for example, another American engineer, has perfected a system which he calls an "efficiency system."³

In differentiating his own organization from older forms, Taylor called the traditional system the management of initiative and incentive. This type of management was based on recognition of the fact that the worker possessed the skill and initiative necessary to industry,

¹ H. B. Drury, *Scientific Management ; A History and Criticism*.

² *Ibid*.

³ See *The Twelve Principles of Efficiency*.

and that management must provide incentives to put them into operation. Taylor aimed at transferring to management the knowledge of the workers and at developing it to the utmost. Then it was to be analysed and handed back to the workers in piecemeal fashion, with the consequence that no worker could possibly be any longer the complete master of a craft.

Taylor's name first began to be known when he was working as a foreman in the early eighties of last century with the Midvale Steel Company of Philadelphia. He was struck at that time by the fact that the management had nothing like an accurate idea of a man's working capacity, since every worker, through the fear of his piece-rates being cut, deliberately concealed all indications of the exact extent of his powers. Taylor resolved to discover scientifically what work a man could reasonably be expected to perform in various occupations, and having satisfied himself that his calculations were correct, he set himself to secure results in accordance with his own carefully-worked-out idea of a good day's labour. His achievement in getting pig-iron handled at the rate of 47 tons a day instead of the customary $12\frac{1}{2}$ tons a day is an example of his success in speeding up the human machine without increasing its "wear and tear." A close study of Taylor's methods will reveal his remarkable understanding of certain of the principles of human motivation. It is open to question whether his success was such as to make it worth while for English employers to copy his methods.

The problem facing Taylor was to get the labourer to give the whole of his energy to his work. His solution unfortunately involved the atrophy of the spontaneity and initiative of his workmen. The philosophy underlying his methods seems to have been that the world is made up of a few supermen and a multitude of creatures intended by Providence to be drudges.

One of the first requirements of a man who is fit to handle pig-iron as a regular occupation (he says) is that he shall be so stupid

and so phlegmatic that he more nearly resembles in his mental make-up the ox than any other type.¹

Taylor found a man named Schmidt who answered to this description, and he was told how and when to lift his pig-iron, how and when to carry it, the rate at which he must move, when he must stop, how he must rest, and so on. How to find others was the problem.

It is happily probable that the type of labour which directly involves the brutalization and mechanization of the worker—and pig-iron loading under Taylor's orders can hardly be described as resulting otherwise—will disappear if a vigorous scientific offensive is set up against it. In the case of stoking, a particularly heavy and only semi-human kind of work, we have begun to solve the problem automatically by the introduction of oil engines.² Common sense approves such innovations.

Taylor mechanized production generally; it was his declared objective.

All possible brain-work (he says)³ should be removed from the (work) shop and centred in the planning department, leaving for the foremen and gang-bosses work strictly executive in its nature. . . . Each man must adapt his methods to the many new standards, and grow accustomed to receiving and obeying directions, covering details, large and small, which in the past have been left to his judgment.

Intelligent interest and the opportunity of expressing individual self-expression having thus been eliminated from the life of the workmen, it was natural that Taylor,

¹ *Principles of Scientific Management.*

² It has been suggested that firemen should undertake a course of instruction in the art of stoking, but Mr. Wallwork, President of the Oldham Branch of the Engineers and Firemen, when questioned recently on the point, said it was the general belief that no man would work as a fireman on an engine unless he was "a slate short." "Firemen," he added, "are generally said to be strong in the arm and weak in the head."

A fireman, was his conclusion, did not feel like bothering with any education after he had finished his day's work. "All he felt like was tumbling into bed."

³ *Shop Management.*

who rarely seemed to reckon upon *sentiment* as a factor worth consideration, should have aimed at securing adequate motivation almost entirely through mechanical means, as, for example, by an adjustment of the wage-system. The piece-rate system which at first had been found immensely superior to the day-rate system had ceased to result in increasing efficiency owing to the frequency with which piece-rates had been cut. It had been discovered, too, that the purchasing power of money tends gradually to fall as earnings rise.

With the early development of scientific management there are associated several "improved" systems of "payment for labour," such as Towne's "*Gain Sharing*" system,¹ which made an appeal to the co-operative spirit in the workshop by a distribution of the savings on the cost of production effected by the labourers themselves, but did not reward *individual* effort in proportion to its value; Halsey's *Premium Plan*,² an ingenious adaptation of the piece-rate system by which management always got more out of increased efficiency than the workers responsible for it; the *Rowan Plan*, first tried in Glasgow, and somewhat similar in its effects to the Halsey Plan, but fairer to the labourer who just exceeded his normal output; and the *Gantt Bonus System*, of which more will be said later.

Taylor's wage system³ was based on an exact *time study* of the elementary movements involved in a given task. These were measured, in chosen cases, by a stop-watch: a percentage was added for unavoidable delays, and piece-rates were based on these calculations. The rate was fixed at such a figure as would penalize the man who did not put forth normal effort, but reward *well* those who exceeded it. A low rate of pay was accordingly fixed until the output was considered satisfactory. When this point was reached a higher wage was paid, and was applied retrospectively. Such elementary time-

¹ *Transactions American Mechanical Society of Engineers*, vol. x.

² *Ibid.*, vol. xii.

³ *Ibid.*, vol. xvi.

study as Taylor employed was held fast by the early advocates of *scientific management* as the key to the solution of the wages problem.

The attempt to stimulate workers into full activity by means of a re-adjusted wage system was characteristic of the first stage of progress in the scientific management movement. Taylor saw clearly that the possibility of coupling low labour cost with high wages depended mainly in utilizing the enormous difference between the amount of work which a first-class man can perform under favourable circumstances and that which is actually done daily by the average man. In so far as Taylor modified his wage system it was to bring it into harmony with Gantt's bonus system. By so doing he improved it considerably.

Henry L. Gantt, said to be the strongest man in the scientific management movement, worked with Taylor at the Bethlehem Steel Works from 1899 to 1901, and during that period introduced his *Task Work with a Bonus System*. A bonus was paid to every man who completed his task, and to the "boss" there was given in addition a small sum in respect of each of his men who was thus successful. The boss received, moreover, an extra bonus when every man under him completed his task.

Suppose the gang boss received three dollars a day, and had twenty men working under him, he would be paid, say, in round numbers, ten cents apiece for each man under him who received his bonus; and if all twenty men received their bonus, he would receive a double bonus of twenty cents apiece for the entire gang.

In this way it was made profitable for the boss to help the weaker men. The system was also more popular than Taylor's because it did not penalize the worker who fell behind with his work.

There is, however, a definite limit to the effectiveness of any such wage system in stimulating production. Not all individuals are so mentally constituted as to be able to do their best work under piece-work conditions. Piece-work produces in some workers, who are of slower mental

reaction and more highly unstable emotionally than others, a nervous tension and anxiety which impair their efficiency considerably.

We discovered during the recent world war what was found to hold when the Panama Canal was being constructed, viz. that there is a point at which increases in wages cease to produce increased effort. Further efficiency must be sought through the employment of other than purely mechanical means. Man is not wholly servile, materialistic, and responsibility-shirking, so that the best as well as the meanest motives can be made a successful ground of appeal. Any gang of workers who could, for example, kindle among themselves the unity, interest, and enthusiasm of a private theatrical party or amateur football club could easily create records beside which the Taylor and Gilbreth achievements would look shrunken and anaemic indeed.

A real and fundamental objection which may be urged against *rate-fixing* and *piece-work* is seldom heard. It is that these practices unfairly penalize the maturing male worker who, just as he finds himself in need of an increased income to provide for his family's requirements, discovers often that production has become so mechanized as to leave him unable to compete at an advantage with quick-fingered girls and boys.¹ Thus there would seem to be a solid basis for his apprehension that he may be "too old at forty." This fear should be taken into consideration and should be negated by the formulation of adequate schemes for promotion.

But though it may be urged by the workers that piece-work and payment by result systems appeal to the lowest motives and tend to break down labour solidarity by making favouritism and selfishness possible, that they lead to an undignified scramble for the best jobs and a

¹ "In some branches of the boot-finishing trade the fact that women are able to earn higher wages than the men so aroused the jealousy of the men that they had to be separated" (Greer, *Proc. Econ. Sci. Sect., British Association*, 1919).

cornering of special tools, it cannot be maintained that they are at bottom incompatible with trade unionism. It is to the manner of their imposition in many cases rather than to their remediable defects that the real labour objections hold.

In one psychological respect Taylor's introduction of standard tasks which were to be performed in a carefully estimated and allotted time worked well, as he foresaw it would. When the worker knows exactly what he is expected to do, how to manage it, and in what time it ought to be completed, and when, moreover, he has reason to believe that he will be able to perform the task as many others have already done without undue strain, there is a freedom from anxiety (which accelerates the approach of fatigue), and consequently a greater concentration of effective effort. But the success of such a system depends wholly upon the fairness of the rate-fixing, and thus will involve an analysis both of the task and of the worker's attitude towards it; and we should remember in this latter connection that the worker is legitimately desirous of ensuring not only a good wage but a reasonably long working life as well.

(It will be observed that Taylor omitted to take into consideration a problem which every social student must face, that of *unemployment* among those who fail to come up to the requirements of the scientific management expert. One cannot continue indefinitely to leave the solution of this problem to the State on the assumption that the organizers of industry may only attend to the needs of the workers actually in their employ. As long as this assumption is held, labour will be justified in believing that its value to management consists in its exploitability.)

ADDENDUM

A typical premium bonus scheme of the present day, aimed at making good the defects of earlier schemes, is *The Priestman Scheme*, initiated a few years ago by

Messrs. Priestman Bros. of Hull. We take the following description from the *Journal of the Industrial League and Council* (July, 1920):—

The scheme appears to have been inaugurated during April, 1917, as the result of a series of conferences between the firm and the men, and approved by the Engineering Trade Unions.

The Boilermakers appear to have held aloof from the scheme, and were paid on a time-work basis of time and a half.

A standard of output was agreed to as representing the normal achievement of the work, and was fixed at 110 tons per calendar month. The standard and district rate was guaranteed, and the percentage bonus for increased output is paid on that basis.

From its inception the output of the works increased, and on an average the figures equal 68·8 per cent.

In some months 98 per cent. has been made, but the average is round about an increased output of 70 per cent.

The system is described as applying team-work to industry. The standard output was established on the work of a given number of men during the year 1916, and was arrived at by the management in collaboration with a Shops Committee upon which the Trade Unions were represented.

The books showing the daily deliveries are open to the inspection of this Committee, and monthly returns are posted up in the works. The output in this way is calculated month by month, and the increased wage is applied in the following month. It appears that the percentage of increase is paid on a weekly basis, and everybody, from the lowest paid to the highest, from the office boy to the works manager, participates. Thus, if in April the output is increased by 50 per cent. over the standard, during May the boy whose wage is £1 would get £1 10s. per week, and the Manager whose salary is £10 per week would receive £15.

It is said of the system that it realizes that the greatest efficiency is only to be secured by the willing co-operation of every person employed in an establishment.

It has discovered that the draughtsman and the typist, the time-keeper and the carman, can each exercise influence upon the efficiency of the establishment, its smooth running, and its output. The firm is an engineering establishment which produces a great variety of work, ranging from the heaviest castings to the smallest mechanisms.

In order to simplify the working of the scheme, tonnage only was taken into account, and the percentage bonus earned is reckoned on the total weight of finished articles produced.

§ 2. TAYLORISM: LATER PHASES

The second phase of the early scientific management movement was characterized by an attempt to standardize methods and conditions of work: wage adjustment had played its part and to some extent had been found wanting. Attention was accordingly turned in fresh directions in search of the means of increased efficiency. It was discovered, while processes were being timed, that the dissimilarities in the machines used, and in the ordinary working conditions—of atmosphere, noise, supply of materials, time of day, etc.—were responsible for great variations in results. This led to the movement for the standardization of machines and their parts, of tools and equipment, of methods and processes. Such standardization obviously leads to a much greater uniformity of working conditions and provides a basis, in the possibility it holds out of applying scientific methods of measurement, for making working conditions as perfect as they can be made. To ensure standardization in the organization of industry Taylor introduced the following features:—

1. *Instruction Cards*.—These contained directions for the performance of special pieces of work, indicating what tools were to be used, and how the speed at which the machines involved were to be run, etc. There was considerable trouble caused in 1911 in the U.S. Government Arsenal at Rock Island through the introduction of the instruction card, but when the management stood firm and the system was given a trial, opposition disappeared. But the ground of opposition was changed rather than removed altogether.

2. *Route-ing*.—We have already spoken of route-ing, meaning, by the term, the arrangement of the work to be done in such a

way that there is a steady stream of traffic through the shops in the shape of manufactured parts and articles with neither congestion nor slacking off anywhere, and so that each job goes to the man or machine best fitted to deal with it.

3. *Motion Study*.—This was intended to provide the means of standardizing skill and habits of work generally.

4. *Selection of Workers*.—Taylor sought to select his workmen for their jobs very carefully, knowing that not all men have the particular aptitudes demanded in a particular piece of work.¹

As these innovations began to make themselves effective it became necessary to modify the general organization of factory management. The responsibilities of the foremen, for example, grew perceptibly with each new method introduced. Any one ordinary man could no longer be expected to possess the brains, technical knowledge, energy, tact, organizing ability and initiative called for by the reorganized systems of workshop control. Thus a third phase in the development of scientific management was rendered imperative. In this third phase we find the principle of *functional management* introduced. Instead of there being a single foreman in each workshop responsible for a multitude of duties, Taylor introduced the principle of *one man one function*.²

The older, traditional type of organization man has usually called *military*. For the purpose of maintaining ceremonial discipline and stereotyping status it is perhaps unrivalled, but because it involves a continuous grading of men by ranks (each with its own particular rate of pay) to which there corresponds no scale of definitely graded qualitatively different functions to be performed, it is frequently much too wasteful of human ability. An investigation of the system as it is seen in working often reveals men of matured experience who have been promoted because there were vacancies above them to be filled and for no other discoverable reason, performing nothing but the red-tape tasks of routine supervision. A cynic might well say that in the cruder varieties of

¹ *Shop Management*, pp. 95-110.

² *Applied Motion Study*, p. 22.

this type of organization the higher you rise the less you do, but the more you get paid for your idleness. It is widely recognized to-day that this traditional method of organizing men, whether in government office, in church, army, political party, factory or business house, is, unless seriously modified, thoroughly unscientific, and unworthy of a cultured age. The system is called *military*, but the modern army, of course, is no longer organized *wholly* in accordance with it: even army organization moves with the times.

The division of authority in scientific management is in accordance with functions. In the first place there is a clear division between the planning and performing functions. In the planning department resides the responsibility for arranging what is to be done, and how; in the performing department lies the responsibility for doing it according to instructions. It will be seen that, theoretically, the individual workman may receive orders from eight possible overseers, but practically, it is claimed that what really happens is that he receives help from eight teachers, whose specific duties are as follows:—

1. *The Route Man* looks after the traffic of the work through the shops, planning its route in advance, and arranging which workmen shall handle it in its passage. He is responsible for the disposition of the plant so that a smooth journey is ensured for every job with no doubling or redoubling of the path of its progress. In the Ford motor shops, for example, you can see the motor car take shape and grow as it passes on along its route from one set of workers to the next, for the various tributary streams of effort flow together, and the whole which appears first in a skeleton form is gradually elaborated and puts on body stage by stage.

2. *The Instruction Card Man* has to work out in detail the method of least waste for the performance of any task, and then state clearly the steps which are to be taken by the worker to get it done, specifying the tools and machines used and everything relevant to efficient workmanship.

3. *The Time and Cost Clerk* is responsible for the pay-sheets. He calculates the cost of each process of manufacture and compiles records of such costs which serve as the basis of new estimates.

4. *The Disciplinarian* keeps the peace in the factory, arbitrating in cases of dispute, and anticipating wisely, whenever possible,

the outbreak of dissatisfaction. Any worker with a grievance may appeal to him and be assured, theoretically at least, of sympathetic attention.

5. *The Gang Boss* is entrusted with the duty of seeing that the men know how to comply with the instructions issued from the planning department. It is he who is the pivot in the operation of the Gantt bonus system. It is possible for a good gang boss to diffuse a healthy spirit of co-operation among his men, and exercise an influence for good, too, through his teaching function. It marks a distinct step forward in the psychological management of industry for Taylor to have devised a method which makes it worth while for a foreman to *teach* his workmen. (Readers will remember that by the Gantt system the Gang Boss receives a bonus for each workman who completes his task satisfactorily, and a double bonus if all are successful.)

6. *The Speed Boss* does not so much speed up the men, as might be suspected, as to see that the machines move at the standard rate. The best speed for a particular job is not necessarily the fastest speed; danger in so far as it is a factor to be considered may arise equally from excessive speed as from a speed which is too slow for the type of work in hand. Occasionally he will be called upon to demonstrate the possibility of performing a task at the standard rate.

7. *The Repair Boss* keeps the machines in good running order and overhauls them when necessary and possible.

8. *The Inspector*, by carefully watching new workers and new processes, ensures the correct handling of the task to be performed. He acts in an advisory capacity at such times, and he is urged to be constructive rather than destructive in his criticisms.

What has been the worker's reaction to these innovations?

As to whether a man is worse off under eight such bosses as these than he was under one will depend on his individual temperament and upon the way the system works out in practice. It is probably a great effort for some persons to adapt themselves to the more complex and varied supervision of the scientific management system: it is easier, that is, for such workers to get used to the presence of one responsible personality than to that of several. To this type of worker the leaders of the movement say, "It is not that we provide eight masters for you, but rather eight teachers and

helpers : your work is standardized and perfectly definite, so that you have the advantage of knowing exactly how far they are justified in interfering with you ; moreover, in the disciplinarian you have a referee to whom you can appeal when the occasion calls for it." It would seem, therefore, to some that there can be no rational objection to this feature of the new management. But other views have been expressed. Thus one employer has said : " It is quite impossible to replace the influence of the one foreman with his personal hold over his men by any galaxy of experts." Mr. H. L. Gantt has also declared that the separation of the work of instruction from that of inspection has been a failure.

Drury¹ thinks, however, that it is only by means of functional organization that originaive force can be given free play. Most of the potential originality of subordinates fails to come to the surface under prevailing types of management because it must first pass through the consciousness of an over-responsible executive. At any rate, it cannot be said that we have got beyond the stage of *a priori* argument on this point. We may, perhaps, close this section with the weighty opinion of Mr. Henry L. Gantt on some of the more general points we have discussed.² " It is undoubtedly true that the ' efficiency methods ' which have been so much in vogue for the past twenty years in this country (America) have failed to produce what was expected of them. The reason seems to be that we have to a large extent ignored the human factor and failed to take advantage of the ability and desire of the ordinary man to learn and to improve his position. Moreover, these ' efficiency methods have been applied in a manner that was highly autocratic. This alone would be sufficient to condemn them, even if they had been highly effective ' which they have not."

¹ *Op. cit.*

² *Organizing for Work*, pp. 89-90.

§ 3. THE PSYCHOLOGY OF REPETITION WORK

We have seen that the work of men like Gilbreth, a typical representative of American scientific management, has led to the establishment of the following principles of work:—

1. There must be an exact study of industrial processes so that every movement of the worker is rendered susceptible of measurement.

2. There must be an abolition of all movements not essential to efficiency, e.g. those of the bricklayer in raising and lowering his body in getting mortar and bricks from the ground where they need not be.

3. There must be a reduction to a minimum of all such acts of attention and decision as interfere with speed, e.g. hunting for the appropriate tool or part when assembling a machine.

4. There must be a teaching of movements superior in skill to the traditional ones which they will substitute, e.g. the simultaneous employment of both hands in bricklaying and typewriting, in place of the successive use of separate hands or the exclusive use of a single hand (or finger).

These principles have through their application raised many interesting psychological questions. Gilbreth deserves the warm thanks of all men interested in economizing human energy for his incomparable pioneer work. The psychologist is especially indebted to him for having elaborated a method of studying in a concrete objective

form the actual working of the mind in a learning process. One can *see* the quality of a man's skill in the wire motion-models which are constructed from the *stereochronocycle-graph*, obtained from photographing and timing given movements in three dimensions.¹

Gilbreth, however, has made himself the target for the criticisms of those who see nothing but evil in our industrial system. If the bricklaying technique which he displaced has been in use for centuries, they would say, it is because it suits man; whereas it has been abundantly proved that large-scale modern industry is entirely unsuited to his nature. Let Dean Inge speak for this type of critic:—

The human race has been for thousands of years a race of tillers of the soil, of hunters and of fighters. These are the occupations for which we are adapted, and we are not acclimatized to any other. . . . Farmers, gardeners, and shepherds have the happiness of perfect health in a life which suits the natural constitution of man . . . the factory hand dislikes his work, and dislikes it in proportion as he is subjected to the extreme specialization and machine-like motions of up-to-date machinery. It looks as if the whole of our industrialism was based upon a mistake.²

Continuous repetition work, he would probably say, is as injurious to the *mind* as exposure to excessive glare in glass-bottle finishing, or to anilin oil or T.N.T. in shell-filling is to the *body*.

Some opponents of repetition-process work urge that in the interests of physical growth alone it should be condemned, that occupations which call for the use of no more than a few selected muscles of the body, so depriving in many cases the fundamental muscles—e.g., the Gilbrethian bricklayer's abdominal muscles—of their natural exercise should themselves be eliminated. A man who is continually using but one set of muscles grows so that eventually he can use no others. We cannot, however, fly in the face of the great drive of modern industry

¹ See pp. 61–62.

² From a sermon, November 23, 1919.

toward the specialization of function and the speeding-up of production. The remedy to be found for its disadvantages will not lie in the abolition of specialization but in a diminution of the hours of labour, in thorough ventilation and cleanliness of working conditions, in alternative exercise and in adult education.

The more serious charge brought against scientific management in industry is that it is gradually resulting in a complete separation of the manual worker from the brain worker, and that the latter is steadily monopolizing to himself the interest—and it is ever increasing—which is wrapped up in industry, thus leaving to the former nothing but monotonous toil. The change is powerfully urged, and the modern psychologist who has intervened in the conflict of argument consequent upon its discussion has not yet taken an independent attitude. The tendency of many writers is to follow the American psychologist, Münsterberg,¹ who wrote a few ill-advised paragraphs on the subject some years ago.

The business of the industrial psychologist is, among other things, to discover the best mental and physical conditions for the production of the best possible work. Münsterberg argues as though these already exist in large-scale industry. He implies that the monotony of factory operations exists only in the imaginations of outside observers who seeing or hearing that workers perform certain mechanical movements thousands of times a day, year after year, think that there is a similar unvaried mechanisation of the thoughts and feelings of the workers themselves. He quotes the case of a workman whom he found pushing strips of metal forward into a hole-cutting machine and making 34,000 uniform movements daily. This the man had been doing for fourteen years. Münsterberg also found a girl who wrapped up electric lamps in soft paper at the rate of 25 in 42 seconds, day in and day out. Both workers confessed to experiencing the greatest pleasure in their task: they

¹ *Psychology and Industrial Efficiency*,

found it interesting and stimulating and seemed quite intelligent !

Münsterberg, however, gives away his case. In following up his argument that "age cannot wither nor custom stale" the infinite variety of the endless repetition of mechanical movements of a circumscribed pattern, he says that, of course, all depends upon the individuals as to what they find monotonous. Indeed it does. Can we imagine a Newton or a Shakespeare content to wrap lamps at the rate of twenty-five in forty-two seconds for the duration of their mortal life? And can we as a nation face with equanimity the steady increase in the number of workers whose mental outlook is so narrow that they are *content* to be riveted for life to a single unvarying task? A certain amount of routine work is good. The mental discipline of such efforts is probably quite as essential to a well-balanced personality as, say, a rhythmic system of physical exercises is to a healthy body. "But to say that the chief pre-occupation of the day should be to touch one's toes the maximum number of times in return for the means to purchase the heat units required for the performance of the same ritual on the following day," as one writer¹ has put it, is to show an amazing ignorance of the "limits" of human nature. Looking at the matter from the standpoint of the abnormal psychologist, we shall find that, though seen in a slightly different perspective, the general mental affects of an excessive specialization are much the same in reality. The normal human being passes through several stages of development, moving on from one level of social adjustment to a higher one, and thus acquiring increasing skill and satisfaction in his adaptations. If the intelligence is such that it cannot rise above a low level of imitation into the higher spheres of invention, then no pathological result will ensue by closing the channel which leads from one to the other; but if the tide of life in full vigour and flow cannot

¹ A. R. Orage in *The New Age*.

continue to rise and make progress, then the impeded stream must either find new channels of passage—in religion or politics, in hobbies or in research, for example, and these will necessitate a considerable development of intelligence which the routine worker rarely possesses—or the flood burst its banks.

One of the great factors in the winning of the war was the ready adaptation of the human mind on the part of the Allies to the emergencies which had continually to be faced. Intelligence is essentially “a general capacity of an individual to adjust his thinking to new requirements: it is general mental adaptability to new problems and conditions of life.”¹ Such a capacity needs exercise, and the argument which Münsterberg does not fairly meet is that by consenting to man being permanently employed as the mere servant of a machine instead of as its master, we are really depriving him of the chance of developing his intelligence.

Let us state the case as a dilemma. The psychological dilemma concerning the monotony of repetition-process work is this: either the worker employs all his powers on the task, in which case there is established an undesirable limitation and stereotyping of mental process so that the movements of his mind tend to become unduly circumscribed and uniform, *and this is bad for the worker*; or the mechanical processes tend to be carried on automatically while the conscious attention is given to other things, which means that only a small portion of the worker's energy is given to the work, *and this is frequently bad for his employer*.

We have already said that it is desirable for the sake of civilization that industry should be made interesting, so that any solution of our difficulty which involves a complete focusing of the interests of workers outside industry is no solution at all. You cannot abolish machinery or the repetition-process. Can anything be done to make them more interesting? Can we rearrange work

¹ Stern, *Psychological Methods of Testing Intelligence*.

in such a way that our factories will become filled with workers whose skill is not mere routine skill, but intelligent scientific skill, productive of inventiveness and pleasure? Certainly we cannot remain happy with the present position, because there is a growing number of people who actually *like* unvaried monotony and fear every suggestion of change; and the psychologist who specializes in abnormal mental phenomena tells us quite plainly that such a condition of mind is not healthy. (To be impatient of every bond of custom and regularity is, of course, equally the sign of a morbid temperament.)

In the interests of increased production, processes must be standardized, but minds must be freed. It is for the good of both employers and employed, and, moreover, it is a national necessity that the factory worker should be given greater opportunities of varying his work. It has been abundantly proved during the recent war that many of the processes of industry, which in the past have been regarded as needing highly-skilled attention, can be quickly learnt by intelligent workers. Many are now convinced that as wide an acquaintance as can practically be secured with several processes of manufacture and their *raison d'être* will give the workers a better insight into their particular branch of work, interest them more deeply in the problems of efficiency and output, and so call out the higher mental qualities they possess. And the resulting greater variety in their work would make factory life more endurable.

The practical difficulty is that where piece-rates are fixed the worker finds that he can earn more by staying on the monotonous job than by changing over to another. His reaction, if he is a very intelligent worker, is then apt to be that of a thwarted creature.

Workers are in large numbers trying out a solution themselves, if we interpret the facts of the "labour-turnover" problem correctly. Investigation has been made into the causes of the moving about of large armies of workers from one factory to another; it showed in

one case that out of 10,434 people who left a munition factory during a period of six months, only 992, or less than 10 per cent., could be accounted for. Now, the pioneer firms have found that the continual replacement of workers is most wasteful, and that the opportunities offered for a change of work in the same factory are decidedly effective in checking this turnover, causing a retention of many men and women who would otherwise leave. More inefficiency than is realized is caused through the time spent by probationary workers in getting used to the habits of the new firms they join. One investigator has calculated that every worker who leaves and needs replacement costs the employer from £15 to £20. This wastage which occurs largely through the non-utilization of general interest in the purpose of industry is illustrated by the story of a girl who had worked for many years in a factory and heard after leaving that some people were to be taken on a visit to it. She pleaded to go on the ground that she had worked for her whole working life in one confined corner of it, and often wondered what happened elsewhere. In a good factory the new-comer will be given *at the outset* a general grasp of the aim of the management, and will realize both what the significance of his own task is and what possibilities lie ahead of him.

Closely connected with the problem of monotony in modern industrial life is the problem of speed. As instances of modern speed let us take the following. Some kinds of motor sewing machines carry twelve needles, while others set 4,000 stitches a minute. The operator cannot relax her attention for a second lest through the breaking off of a thread the whole process be stopped. During the busy parts of the day girls operating in telephone exchanges need to move their arms as many times as 120 times a minute, and deal with numbers at a great speed. In the textile industry women are to-day tending an increasing number of looms. Whereas weavers used to look after six Draper looms, they now tend from

twelve to sixteen, an occupation which demands continuous and widely directed attention. Spinners will tend to-day as many as a thousand spindles. The fatigue due to the growing speed and complexity of modern industry is therefore apparently becoming greater than ever. Yet it is a Mrs. Partington policy to oppose unconditionally the speeding-up of industry. The world is crying out for production of food, clothing and shelter, and will continue to cry out for them for a long time to come.

Now, it is interesting to note that industry is speeding up the mentality not only of factory workers, but of the whole civilized world, and to an unsuspected degree : and this is not wholly an evil. The inhabitants of the large industrial centres of the world are, in the process, becoming more and more alike, taking their mental *tempo* from their pace-setters, who are thus to-day tending to become the real leaders of the human race. As to where they are leading the human race is another matter. But there is far less difference in mental outlook between the factory worker as New Yorker, Londoner, or Parisian to-day than there was a century ago. Climatic conditions which vary greatly will continue to play their part upon mentality : the Southern European will always react to impressions with greater speed of emotional response than the Northern European. A clear indication of the fact that there is nevertheless occurring a general standardization of mental *tempo* among civilized people is, we think, to be observed in the gradual acceptance everywhere of the same games and amusements. Formerly each nation had the games and pleasures which suited the natural rhythm of its general mental life. Now cricket (speeded up considerably in the past twenty years), football, baseball, lacrosse, tennis, dancing, etc., are being cultivated everywhere. Those national traditions and culture which *oppose* this movement are, in times of peace, seldom able to compete with the influence of a common mode of life and work, and of common games and amusements in moulding the

character and intelligence of a vast majority of the people of any country. It is, therefore, beyond doubt that if the separatist forms of historic nationalism should come to count—except in times of war—for less and less among the submerged masses, then the supremacy of the future will fall into the hands of the people who, while preserving a mind accessible to new ideas, can get a “move on.” At the moment these characteristics seem predominantly American, and it is this fact which renders America so formidable a competitor to the rest of the world.¹

The reader will have noted and approved Gilbreth's attempts to cut out the necessity for constant acts of decision on the part of the workers. Disorder and lack of method means that tools and material are left where they happen to be dropped, so that when they are needed it involves worry and interruption to find them, whereas it saves energy and anxiety when we know where to look for things. No one can object to a change which renders unnecessary constant decisions about small things: if increased monotony here is the result we shall not mind. It is obviously a human saving if, for example, telegraphic messages are automatically recorded instead of it being necessary for the post-office servant to leave her immediate task every time a message comes through. (Many of us would like to see an invention of a method by which telephone messages could be recorded and reproduced by means of a dictaphone at the convenience of the receiver.) We shall probably see the introduction, too, in increasing numbers of mechanical or electric bells and buzzers which will if necessary give the signal at an appropriate time to the machine operator that attention will soon be necessary at some important point in a pro-

¹ Since there can be no deeply-founded internationalism other than that which has its roots in nationalism, these facts point to the desirability of raising the mass of the people to that level where the best cultural traditions of their community can effectively operate and humanize them.

cess, that a part is about to break, or a supply of some material to fall short. The fatigue due to constant expectation of the call of duty is great, but it may in this way be diminished. One might quote the case of the automatic fire extinguisher and alarm used in many factories. The heat of the fire dissolves a plug, which lets out water, and the flow of the water in the pipe works a motor which rings an alarm.

Gilbreth's attempt to teach combined movements as substitutes for a large number of separate ones are also deserving of great praise. On this point Muscio ¹ is very helpful. He writes :—

The innervation of any one muscle or group of muscles normally involves *some* innervation of other muscles or groups of muscles situated near it. Consequently, if immediately after innervating one particular muscle we desire to innervate another near it, the innervation of the second will not involve the transmission of so large an amount of nervous impulse as if the first muscle has not been innervated. The importance of this for industry may be illustrated by reference to methods of typewriting. It allows us to understand how the use of all the fingers in typewriting is not only a rapid method of operating, but little, if any, more fatiguing than the "one finger" method; for by using one finger only the overflow impulses to the neighbouring finger muscles—involvement in every innervation of the muscle of that one finger—are simply wasted, whereas in the "all-fingers" method they are utilized.

No man would dream of arguing that the typist who practises the "all-fingers" method and writes forty words a minute is more fatigued by her task than another who in a minute by the "one-finger" method knocks out from twenty-five to thirty words. In a similar manner Muscio shows theoretically that it is economical to use simultaneously rather than successively both hands whenever possible, as the Gilbreth bricklayers did.

Still it is obvious that the future of industry and of civilization depends upon a well-organized attempt to defeat the influence of unvaried repetition work amid

¹ *Op. cit.*, p. 91.

noise and machinery in deadening the mental life of the factory worker. The most appropriate manner, after all, of saving human energy will be through the better education of the people. An educated worker makes more methodical and speedy progress than an uneducated worker, and he is apt to retain a greater interest in his work once it is aroused. Moreover, he is often in possession of those habits of feeling and thought and ideals which will be most effective in preventing the onset of more subtle forms of fatigue. There is consequently less "self-compulsion" in the attack upon his work, and so less probability of neurasthenia setting in. We think Gilbreth would finally agree that industrial harmony will never become permanently established till every worker is given a scientific as well as a practical insight into the nature of his work, and an opportunity of employing his inventive powers.

There are many medical men who believe that industrial unrest is in part directly traceable to the monotony of modern factory life. They would explain such unrest psychologically as expressive of a defence-mechanism which has been set up by human nature for its own protection against the greater evil which it half-consciously fears, the loss of virility, that passing of the *joie de vivre*, which would result from too complete an acceptance of the present system. A writer in *The Times*,¹ whom we have already once quoted, puts this point of view quite clearly:—

The human organism is so constructed that it will always react against circumstances which are inimical to its well-being. Were this not so life would be impossible for any length of time. Monotony in occupation, so long as the subject is healthy and has not been broken in a nervous sense, arouses by an inevitable process of physiology the demand for sharp stimulation at other movements. The mechanical process, the ever-revolving wheel, the often-repeated movement, breed surely a demand for excitement which is well-nigh insatiable. The more mechanical the task, the more urgent the necessity of an antidote to it.

¹ *Trade Supplement*, April 24, 1920.

Such antidotes will usually take one of two forms, either active or passive : the form of gambling, drunkenness, and vice, so detested by all those who see them as fundamental realities rather than as symptomatic of an industrial and social evil, or the less obviously abnormal forms of street-promenading, the watching of football-matches, or the silent absorption of the thrills of "the pictures." As the power of active protest declines passive resistance will grow, and some see it growing apace.

The authors of a book recently published detailing the results of an investigation into the condition of the Sheffield working classes describe ¹ 67 to 73 per cent. of the Sheffield factory workers as being mentally asleep ; " they are spiritually inert ; they desire to be at rest and left alone ; they do not live for any means beyond immediate satisfactions ; they are emphatically *not* bad people . . . but at present their value to the community is economic rather than spiritual, that of beasts of burden rather than that of free human beings."

This picture is probably overdrawn ; ² nevertheless it represents clearly enough the danger before us—that of a gradually increasing multitude of workers cut off from

¹ *The Equipment of the Workers* (Allen and Unwin).

² Yet according to the reports of the National Service Boards (*Physical Examination of Men of Military Age*, vol. i.) the citizens of Sheffield took a high place for efficiency when compared with those of other industrial centres. Professor Arthur Keith, F.R.S., M.D., who was a member of the Committee appointed under the chairmanship of Sir James Galloway to report upon the physical examination of men of military age by National Service Boards, said in the course of an interview, " Sir Francis Galton had previously shown how you could estimate the number of fit men you ought to get. His findings, with Professor Karl Pearson's, were applied. Out of one hundred men you ought to get seventy fit for full service. When we began in 1917 to look into the industries in the North, *the cotton industries of Lancashire, the cloth industries of Leeds, we found that out of a hundred men presented for recruits we would only get thirty fit to go.* As far as the defence of the country went, the other seventy were shot before they had their uniforms."

an intellectual interest in their work, listless and unsatisfied, the sport of every wave and gust of popular passion, the prey of every unscrupulous adventurer and quack who seeks to exploit their credulity, and inflammable material for every demagogue who is eager to light up the fires of class or race hatred.

A physical examination of the population of our country has revealed many remediable defects. A mental survey is urgently needed, if only for the purpose of focussing public attention upon the problems with which we are confronted.

§ 4. THE LABOUR ATTITUDE TO SCIENTIFIC MANAGEMENT

It need hardly be said that the workers have not taken kindly to "scientific management." What is the fundamental motive of the objections which organized labour may justifiably raise against Taylorism as a whole? This is an important question. In attempting to answer it we should understand in the first place that more and more is the student of psychology coming to realize that spoken reasons may not always reveal the true motives for any course of conduct which is being defended or explained. First we do things because either from internal or external necessity we must do them, and we find appropriate reasons for having done them afterwards. Thus, if we hypnotize a person and suggest that upon regaining his waking state he will get up from his seat and open the windows in the room, then at the time pre-arranged he will interrupt whatever occupation he may have taken up, and proceed to carry out our suggestion, without the least consciousness of the real origin of his action. And if we ask him what he is going to do, he will give us the soundest of reasons for his action, as, for example, that the room is decidedly stuffy and needs ventilating. An excellent illustration of this tendency to rationalize what we do is to be found in the New Testament in the carefully thought out "reasons" given by the guests who were invited to the Marriage Supper. So that when we have fully discussed labour's declared case for opposition to scientific management it is still possible that the true motive may be unconscious.

Superficial objections on the part of labour to scientific

management will centre about the "unfair" division of profits; or labour may urge that the system means an undue amount of unemployment or that it causes abnormal "speeding up." All these objections can at present be left out of consideration because they are subsidiary to the main objections, just as a worker's consciously stated reason for leaving an employer may be altogether inadequate as an explanation of his decision to do so.

Now, Taylorism thrived in its early days in centres where trade unionism was either non-existent or extremely weak. At the Bethlehem Steel Works, for example, there were *no* unionists in the early part of 1910. From 1882 to 1911 Taylor said that no strikes had taken place in shops where scientific management was in being. Opposition began to develop in 1911, and in 1914 the United States Government set up a commission of inquiry into the allegations of the labour unions against the system. Of the list of trade union objections to Taylorism formulated by the American workers, and set out by Professor R. F. Hoxie,¹ who was one of a sub-commission of three empowered to investigate the working of Taylor's system, the principal was that, "scientific management is incompatible with and destructive of collective bargaining and trades unionism."

Industrial democracy, as we understand it (wrote Mr. J. P. Frey, editor of a labour journal and a member of the same sub-commission), is that condition in the industries which acknowledges and accepts the right of labour to a collective voice in determining what the terms of employment shall be, and the conditions under which men and women shall do the work required of them; it conforms to the principle that government in the shop, like government in the nation, should be by the consent of the governed.²

Now, from the original view-point of Taylor and his disciples there could be no possible case for the unions to argue, since the conditions under which labour was to be performed and the rates of wages to be paid were to be settled not by the crude method of individual or

¹ R. F. Hoxie, *Scientific Management and Labour*.

² J. P. Frey, *Scientific Management and Labour*, p. 17.

collective bargaining, but by the more exact method of scientific experiment. Scientific management, they said, is much too complicated a matter for ordinary working men to understand, and so they ought not to meddle with it. It is clear that in many cases the superiority of management in matters of organization and general intelligence is in no way *obvious* to the worker. Where works are *over-organized*, so that the worker, for example, who requires a small article has to make his application for it in writing, get a chit signed and counter-signed, visit the store and wait an hour for the thing to be found, and so waste time out of all proportion to the value of the article, feels often that management lacks common sense. The skilled worker is quite intelligent enough to know when the efficiency of management begins to flag. In the dispute, for example, between the Brinsmead piano makers and their workmen last year, when the latter were charged with slackness, they retorted that they could not work properly because the organization of the factory was inefficient, a view supported, if we may believe the press, by other piano manufacturers.

According to the scientific management view, there is no legitimate reason for the existence of the unions because scientific management tends to produce harmony of aim and interest between masters and men. "In short, the philosophy of scientific management holds that a good management, like a good father, directs those in its care in ways more satisfactory than the latter could themselves choose."¹ But though it may be admitted that scientific management could be depended upon always to treat the individual fairly, yet in an exceptional case he would have no option but to quit his work if unable to accept his employer's point of view.

As long as scientific management firms were in a minority, and could attract the best workmen by higher rates of pay than were customary, their employees could gain very little, if anything, by bargaining collectively ; but

¹ H. B. Drury, *op. cit.*, p. 195.

when the system becomes more general, a different state of affairs holds, and the fear of "speeding up" and of wage-cutting appears to labour to be well grounded.

The paternalism of the scientific management expert and his unveiled contempt for the intelligence of the worker are certainly irritating to the labour unions, while his cool assumption that he alone ought to be entrusted with the task of calculating "scientifically" the rates of pay of employees, the length of the working day, the type of work a man is fitted for, and so on, is staggering to the English trade unionist. In many instances the leaders of the movement have done real service in their concern for the betterment of the working conditions in their factories, but in investigating the question of the *optimum* length of the working day, they do not consider that, as Drury neatly puts it, "the length of the working day should be fixed with a view of enabling the employee to get the most satisfaction out of life as well as the greatest possible work out of his limbs,"¹ while it can hardly be denied that their wage-fixing experiments were motivated primarily by a desire to serve their own interests, as is well illustrated by the oft-quoted incident at a bicycle-ball factory where by a skilful choice of employees gifted with the aptitudes required, thirty-five girls were found who could do effectually what it had previously taken 120 girls to do. The wages of these more efficient girls were doubled, but through the dismissal of the less efficient the total wage bill was decreased 50 per cent. Taylor's pig-iron loader who increased his output to 400 per cent of the original figure received only a 50 per cent. increase in wages. If it is natural, as will be said, for the efficiency expert to concentrate on cheapening output, it is equally natural that labour should be deeply concerned about the possibilities of unemployment.²

¹ *Op. cit.*, p. 204.

² This is illustrated in the following passage which we take from a daily paper :—"The resolution of the No. 50 Branch of the National

If the introduction of scientific management is to be successful, then there must be a modification of the expert's attitude towards labour. No English employer will argue cheerfully as Taylor did that "the necessity for the labour union disappears . . . when the employers take pains to study the character and performance of each of their employees and pay them accordingly."¹ But when it is conceded that labour has an indisputable right to bargain on the question of wage-fixing and is allowed to do so, and when, moreover, the door is opened through the Whitley Councils to ultimate partnership in industry, there should be no rational grievance against scientific management. Then the first charge upon industry will be that of maintaining for the workers the minimum conditions of social life and satisfaction. Thus the interests of management and labour when wisely furthered from both sides need not conflict. But how can they be made to harmonize?

At bottom it is *fear* and *suspicion* based on long experience which prompt labour's opposition to "capital." Such an opposition cannot be argued out of existence since it is not a product in the main of *reason* at all. It is easy to ridicule the John Balls and Jack Cades of industry on account of their illogical thought (or perhaps loose private morality), but the resentment against the conditions of life for the masses which they symbolize can neither be laughed out of existence nor reasoned away; nor can the suspicion they betray be allayed by mere words or gestures. You can no more argue with a man in a black mood of suspicion than you can with a man who speaks

Amalgamated Union of Labourers on the question of the introduction of the mechanical scaling hammer reads: That this general meeting strongly condemns the action of the district official delegate, also the district committee, in allowing the mechanical hammer to be introduced in Cammell Laird's, after the decision of Messrs. Harland and Wolff's men not to use it under any circumstances, and thereby resolve to take drastic action should the same be attempted on the Liverpool side."

¹ *Shop Management*, p. 186.

a language with which you are unfamiliar, and if you could it would do little good. His attitude may be based on a passing mood, but it might never have appeared had it been wisely anticipated.

An interesting history of industrial life might be written with the growth of public suspicion, a slow underground affair, as its leading idea. Untended by statesmen responsible for public order because it is unobserved till too late, such suspicion arrives periodically at a culminating point and bursts, after which the dispersal of the harmful elements is a matter of some difficulty. The suspicion which expressed itself at the beginning of the Industrial Revolution when looms were smashed and factories burned has not wholly disappeared: workers even yet are not serenely confident of their industrial security. Till such suspicion and fear pass away they must be studied, and it will be easier to predict the times and the seasons of these bursting periods when we realize that the life of the nation to-day pulses most vigorously not at Westminster, but in the warehouses and the factories, on the railways and in the mines. Suspicion and fear *can* be removed, but this process, one of psycho-therapy, will be slow, and need tact and magnanimity on the part of our employers and statesmen.

The labour attitude towards motion study illustrates the suspicion of which we have spoken. Gilbreth is undoubtedly animated by the desire to get rid of wasteful methods of work in the interests of both employer and employed. But he is like a man who has invented a lift to obviate the necessity for the constant climbing of a long staircase. He demonstrates his labour-saving device, and is surprised to find that labour objects to it on the score, say, that to climb a staircase once is preferable to the monotony of using the lift twenty or thirty times, as will probably become the rule if it is installed. It will be in vain that you argue that billiards, skating, golfing, dressing and undressing, and a hundred other occupations which are followed constantly without causing

us boredom are just as monotonous in themselves as the motions one repeats in industry, unless you remove the fear of the worker that you are engaged in a conspiracy to get more work out of him for proportionately less pay. If he doesn't trust you, remember that it isn't altogether his fault. You are conscious maybe only of the best intentions, but he is chiefly mindful of the brutal facts of industrial history which cannot be controverted.

In *The Works Manager To-day* Mr. Sidney Webb illustrates this point very well :—

You must not dream of taking a single step in the direction of scientific management until it has been very elaborately explained to, and discussed by, not only the particular men with whom you are going to experiment, but also by the whole workshop. It will, if you handle it with any competence, be a matter of intense interest to them. You must talk to them both publicly and privately, with magic-lantern slides and experimental demonstrations, answering endless questions, and patiently meeting what seem to you frivolous objections. The workshop committee or the shop stewards will naturally be the first people to be consulted. Remember, it is the men's working life (not your own life) that you are proposing to alter, and their craft (not yours) that you may seem to be going to destroy. You will be making a ruinous blunder, fatal to the maximum efficiency of the works, if you content yourself with bribing, by high rates, bonuses or rewards, just the few individual men whom you propose to put on the new system, whilst leaving the opinion of the rest of the staff sullenly averse. The others will not be appeased merely by the fact that a few selected men are making "good money."

And you must, of course, make it clear in some way, to your own men as well as to the trade union concerned, that what you are proposing to introduce will not merely pay the first lot of selected workmen, and not merely the present generation, but also will have a good influence on the prospects of the whole staff, and will not have any adverse effects on the standard rate, now or hereafter. Unless you can demonstrate this—unless you can in some way automatically protect the piece-work rates from "being cut" *at some future time*—possibly by some future manager—you will be met (and in the national interest you ought to be met) with unrelenting opposition ; and if you impose the change by force or individual bribery, you will inevitably encounter the reprisals of "ca' canny."

One of the questions which it is difficult for labour to argue competently, though in this connection it is *convinced* it has a sound case, is that scientific management will involve a stereotyping of its status as an *inferior* class in society. Labour feels that it is only required in industry as a beast of burden, and it resents the tendency of modern management to usurp initiative and judgment entirely. This feeling is strengthened by the tactless conduct of such semi-educated managers as make use of remarks like the following, "We put the brains into the machines before we put the women on them." The feeling of thwarted manhood is probably one of the blind, unreasoning, unconscious forces responsible for strikes.

Scientific management will thrive in its original form only so long as opposition of this kind can be met and overcome by tact, but the chief recruiting-agency for the ranks of contented timid rabbit-minded labour suitable for mechanical occupations is no longer able to guarantee a continual stream of fresh workers into industry.¹ The public elementary school has hitherto trained the young humanity of the streets for docile factory life with great success. The repressive methods of education which crushed out the vitality of explosive personalities have given way to more enlightened ones, so that now we are beginning to see our children enter industry with bright hopes of discovering there the means to self-expression and happy activity. But before their hopes can materialize there will be a transition period of considerable difficulty to be passed through. The educational tide, however, is now in full flow, bearing upon it to-day not only the old

¹ "Not many years ago Sir John Blundell Maple told the London County Council that his best business employees were those who came from charity schools, such as Spurgeon's Asylum and the Orphan Working Asylum, because they were brought up to discipline and were organizable. The schools of the future will have their discipline, but it will not be the kind of discipline which employers of this type desiderate" (J. L. P. in *Manchester Guardian*, August, 1920).

fleet of slow barges weighted down beneath their burdens, passive slaves of the current, but an increasing number of ships of adventure as well, seeking something of romance and enduring satisfaction in life.

Unless scientific management takes this fact into intimate account, the term "scientific" will eventually become in this connection a word of derision and reproach among thinking men.

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CHAPTER VI

INDUSTRIAL UNREST

§ 1. CLASS CONSCIOUSNESS

THE phenomenon of industrial unrest tends to assume such an ominous shape to-day that we can no longer regard it complacently as the inevitable accompaniment of healthy growth ; we are beginning to see it rather as an unmistakable symptom of the pathological condition of much of our present civilization. The latter view seems certainly to give us the facts as they are in a truer perspective, and this being so, it may be possible that we shall reach an understanding of the inner nature of social disorder through a study of the more easily explored and better understood disturbances which are apt to occur in certain circumstances in the individual mind. Indeed, one might positively say that without a knowledge of abnormal psychology, the science which deals with individual mental aberrations, the student of social phenomena is on a dark uncharted sea without stars or compass.

Many years ago Herbert Spencer attempted to work out in detail a close parallel between a society and an organism. Thus, he said, we may liken the central executive of a nation to the brain ; the telegraphic system to the nerves ; the highways and byways of commerce to the arteries and veins ; and so on. A succession of critics has since ridiculed the analogy as being fantastically overdrawn. But if we now speak, though still figuratively,

of the *common mind*¹ of a people, when represented, for example, in their *common purposes*, as being subject to the same laws as the individual mind, we shall be making use, we believe, of no such similarly untrustworthy analogy.

In the last two or three decades considerable progress has been made in the investigation of the type of mind which is characterized by conflicting and irreconcilable impulses of so abnormal a kind as to cause mental breakdown. Mental disorders which in their etiology baffled the nineteenth-century alienist can now be opened up to a

¹ Obversely, we have Plato's dramatization of the mind of man as a State. See also *Julius Cæsar*, II. I.

" Between the acting of a dreadful thing
And the first motion, all the interim is
Like a phantasma or a hideous dream ;
The genius and the mortal instruments
Are then in council ; and the state of man
Like to a little kingdom suffers then
The nature of an insurrection."

Since the above was written there has appeared in *The Group Mind* a brilliant exposition of this analogy by Prof. McDougall. We quote one or two passages:—

" The enduring reflex and instinctive dispositions of the individual mind we may liken to the established institutions of a nation, such as the army and navy, the post office, the judicial and the administrative systems of officials. These, like the instincts, are specialized executive organizations working in relative independence of one another, each discharging some specialized function. . . . In both cases the mental organization is in part materialized, the instinct in the form of specialized nervous structure, the institution in the form of the material organization essential to its efficient action. . . . The higher type of individual mind is characterized by the development of the intellectual organization by means of which the activities of the various instincts . . . may be brought into co-operation with or duly subordinated to one another. . . . Exactly the same is true of the more highly evolved type of national mind . . . it has a deliberate organization which renders possible a play of ideas ; and through this the operations of the institutions are modified and controlled in detail and are harmonized in a way which constitutes a higher integration of the whole."

more or less detailed inspection ; but our disintegrated social purposes have not yet received the same measure of patient attention on the part of the professional psychologist. Yet there are dissociations or disintegrations of the disturbed social will as deep as those of the abnormal individual mind. The curious reader with a keen scent for parallels would easily be able to outrival the ingenuity of Spencer and discover a multitude of points of similarity between the mental disorders of society and those of the individual ; for example, he would see that just as in dreams we often imagine ourselves to be enjoying something which is denied us in real life, thereby gaining a small measure of shadowy satisfaction, so the community enjoys as rumour or myth that which it would like to see but cannot see achieved ; and just as there are dreams which indicate general health but also those which betray a lack of it, so there are rumours and myths which are creditable to the conscience of a community and those which are not. Or he may realize that *ca' canny* and sabotage are essentially the mark of an industrial obsession, that is, it is due to a sub-conscious belief habitually operative that it is not worth while working hard if others benefit by your labour more than you do yourself. And what is "direct action," he may aptly inquire, but a form of social hysteria, the result of impotence on the part of the central executive in the face of disruptive revolutionary elements ?

During the latter quarter of the nineteenth century Pierre Janet crowned the efforts of the Charcot school of psychiatrists with his penetratingly clear analyses of the characteristics of psychasthenia, hysteria and other less simple types of weakened or disintegrated individual consciousness.¹ To-day, too, we have our students of contemporary civilization who are able to describe in intimate detail the anatomy of our social unrest. But just as we were unable to explain scientifically the causes for the occurrence of what Janet called the

¹ See *The Major Symptoms of Hysteria*.

weakening or the disintegration of the "mental synthesis" in the individual mind before Freud introduced to us his concepts of *mental conflict*, *repression*, and the *unconscious*, and Jung his theory of *regression* and the *complex*, so we shall be at a loss whenever we attempt to account completely for industrial disorder till we can discover for general application some such similarly useful concepts of etiology.

Mr. Trotter¹ has recently helped us to understand how the Freudian concepts may be applied at one point to an elucidation of our social problems. Freud, as a typical individualist, speaks of the early appearance in every young child of a tendency to repress from consciousness those pleasurable ideas and wishes which it would cost him much pain to express. Throughout life this tendency continues, so that in most cases there develops in the unconscious "regions" of the mind a steadily increasing complexity of desires which are unacceptable to the rational personality, and are consequently "kept under."

Yet one cannot easily imagine that a child brought up from birth in complete isolation would find himself often torn between conflicting emotions. Now, Trotter is able to illustrate to us quite clearly the fact that man is, as Freud truly declared, a "double-minded" creature of warring impulses, though not because of a mental conflict which is wholly determined from within, but because he is compelled as a gregarious creature either to accept the conventions of the social group of which he is born a member, or to live the life of a social outcast; he finds it imperatively necessary, that is, to repress certain of his *anti-social* tendencies, some of which cry out urgently at times for satisfaction. This is difficult for the socially oppressed. Still, the healthiest individuals are those who are able to "sublimate" rather than obliterate these anti-social tendencies; and by a gradual process of refinement give them socially approved forms of expression:

¹ *Instincts of the Herd in Peace and War.*

thus, in the case of the man completely adapted to social life carnal lust will blossom into pity and lovingkindness, animal pugnacity take on the form of ideal striving, morbid curiosity find ideal satisfaction in scientific research, and so on. But where crude passion is strong, and, owing to defective training or unfortunate circumstances, no socially approved substitute forms are spontaneously discovered, then mental "civil war" between the "ego" and the "herd" impulses frequently occurs, and in such times of crisis the mind which is unable to stand the strain becomes either seriously weakened or disintegrated.¹

Even though in the normal mind we may find that what is repressed apparently disappears, it is still unconsciously alive and alert, ready to burst out into expression when self-control is relaxed through fatigue or overstrain, thus remaining always a potential menace to well-being. We cannot get rid of undesirable ideas or feelings by a ruthless attempt to banish them from the conscious mind, because, if we try, what happens is that they are merely thrust down deeper into the mind where they are beyond the healthy surveillance of the reason. There is no better way of ridding oneself of a troublesome complex of ideas or feelings than to search it out, with the aid of a psycho-analyst if necessary, restore it vividly to experience, face it frankly and rationally, and having understood it, plan substitute activities capable of draining off from it all the current of its vitality. The main lesson from this for the student of social phenomena is that you cannot preserve industrial peace by keeping what corresponds, in society, to the complex "under," "in its proper place." Frank face-to-face discussion and mutual toleration will alone restore our social equilibrium.

¹ It is probable, we think, that in the history of man's mental evolution, phylogenetic as well as ontogenetic, self-consciousness appeared as the result of the clash of sex and hunger impulses on the one hand, and of the herd conventions on the other. "Selfishness" before this event was and is non-existent.

Now, the governors and the governed, the employers and the workers have, since the Industrial Revolution, too often stood in relation to each other as the conscious to the unconscious, as the rational to the irrational, as the superior to the inferior, as the approved to the disapproved. They have led different lives and pursued different interests, rarely meeting on common ground. The sane and single-hearted person is free from complexes because he knows himself thoroughly and because he has no desires or ideas which are so mutually incompatible that he is afraid to face them. Similarly, the healthy community will be one in which the lion lies down with the lamb (as well as the donkey), and there is no "repression" of any class of society which has a grievance. For as in every individual, so in every society there is no unrest which cannot be traced to a conflict of deeply-rooted emotional tendencies. The mere existence of differences of opinion or of social status will not produce a lasting disharmony. But society to-day is like the family where, in place of common interests, cross-purposes continually prevail, where the children who are unable to bear in tranquillity the heavy hand of a tyrannical parent secretly rebel against his authority and react under the constant influence of *concealed emotion*. Now, abnormal psychology teaches us that the whole course of life may be decided once and for all by the presence of such an "inferiority" complex vitalized by low flash emotions as often develops in the children of a harsh parent or guardian who thwarts them at every turn.

In a study of social unrest we shall find that the conduct of the labouring classes possesses in periods of unrest all the characteristics of that of an individual reacting under the influence of a repressed complex, all the quality of the behaviour of the neurotic son of a stern unbending father. The attitude of the employer towards labour is also frequently the result of a pathological reaction due to subconscious fear. Every one who is acquainted with the social history of modern communities must be

aware that the story of the manual labourer is a long record of suffering and oppression, broken occasionally in the past by such incidents as the Peasants' Revolt in England, the Peasants' War in Germany, and the Revolution in France, but more frequently to-day by strikes and sabotage: all are reaction phenomena marking the eruption of emotions which have been too long repressed. It has been made difficult for the embittered worker to take the social point of view. If such things continue, then our statesmen must forfeit their right to respect. There has been, as will be admitted, far too much fear of losing prestige, and too much contempt for the "lower orders" in most of the dealings of capital with labour in the past. The call for "stern measures," however, usually betrays the tyrant's feelings of insecurity. Wherever there is exaggerated feeling there may be reason to suspect the presence of morbidity of temperament.

In the normal mind it is when reason is unable to harmonize the warring impulses, and abdicating her impartial throne, throws in her lot with one set of tendencies and strives to repress the others from consciousness, that mental breakdown is apt to occur. We have the exact parallel of this procedure at the outset of the Industrial Revolution, a parallel which no being with omnipotent powers could have substituted with closer faithfulness. Up till the end of the eighteenth century Parliament fairly represented the national conscience and reason, dealing dispassionately and usually in the common interest with the grievances of both employers and employed when submitted to them. But with the enactment of the Combination Laws (1799-1800) Parliament ceased to be a unifying factor in the national life, and by adopting the settled policy of *laissez faire* (when it did not openly side with the employers) left the disintegrated classes to fight out their quarrel. Historically, then, as well as psychologically, abnormal conditions precede the appearance

of *class consciousness*. And exactly as the repressed *complex* in the individual mind remains to disturb the peace of the individual mind, so the workers who were for several decades forbidden to combine openly were driven to plot in an underhand manner against those who had thrust them down into subservience. The first quarter of the nineteenth century provides innumerable instances of blind and violent reaction against the law, of secret conspiracies, sabotage, outrage and revolutionary sentiment. The conduct of both employers and employed was characterized by *over-reaction*, the surest sign of abnormality.

Books like *Six Centuries of Work and Wages*,¹ *The Town Labourer*² and *The Skilled Labourer*³ make unhappy reading, but they help us to realize why mistrust and anger still prevail. While the workers have demanded freedom, those in control of the industrial system have insisted on their subservience. Until recently the accepted doctrine was that industries belonged entirely to their "owners," so that labour ought not to concern itself about anything but wages, hence the belief of labour that capital cares nothing for labour, except as a profit-producing instrument. We may now say that the years of subservience have passed, but their legacy of hatred remains. Every one who has actually lived the life

¹ See S. and B. Webb, *History of Trade Unionism*.

² Thorold Rogers.

³ J. L. and B. Hammond: "And so we see on one side strikes, outbursts of violence, agitations, now for a minimum wage, now for the right to combine, attempts, sometimes ambitious and far-sighted, to co-operate for mutual aid and mutual education, the pursuit from time to time of projects for the reform of Parliament; on the other, Ministers and magistrates replying with the unhesitating and unscrupulous use of every weapon they can find: spies, agents provocateurs, military occupation, courts of justice used deliberately for the purposes of a class war, all the features of armed government where a garrison is holding its own in the midst of a hostile people. It is not surprising that a civil war in which such issues were disputed and such methods were employed was fierce and bitter at the time, or that it left behind it implacable memories."

of the poor of the slums for several years will agree that the emotional reactions of bitterness and suspicion are so deeply inwrought as to be wellnigh ineradicable : they have become rooted habit. The class-war may not, as such, openly exist, but every inflammable factor is unfortunately ready to hand for the firebrand who shall have the audacity when a crisis is sufficiently acute to start a general conflagration. Unless we grow wise in time, such a calamity will be rendered inevitable. When management, therefore, flouts the intelligence of the workers, may we not say that we have a social phenomenon exactly parallel to that which is manifested in the behaviour of an abnormal individual whose mind is split into two clusters of interests which function separately ? Only a *common purpose* or a *common interest* can restore unity and health and the possibility of permanent progress. Without such a purpose the outlawed factors may completely disorganize the whole of which they are a despised part.

From this heritage of mistrust and sense of inferiority, which is the common lot of millions to-day, the only way of escape for the worker is to pass out of the category of wage-earners. Thus the type of labour leader whose idealism is not proof against prosperity finds that he has no longer the passion of a rebel when his status is that of a privileged person, and he ceases to have a *personal* grievance against those in authority.

But those who are compelled to remain poor, and are neither enfeebled through constant drudgery, nor able to escape through the gate of phantasy to where they may be nourished by " myths " rather than starved by a starker reality, find it practically impossible to remain long at peace, for daily the irritating extravagances of the well-to-do are flaunted before their eyes ; and though they may not so lose control as to proclaim open war on those whom they imagine to be unrighteously impoverishing them, they nevertheless take advantage of every possible means short of it to give vent to their bitterness of heart. We have no fire, that is to say, but there

is, nevertheless, much unmistakable smouldering. The danger of an intensified conflict between rich and poor will be the greater when the better educated sections of the community are also being thrust down into positions close to the poverty line. A submerged *intelligentsia* cannot submit long in modern times to degradation (Russia has shown) without lighting the torches to be used to burn down the structure of civilization about our ears.

If we are right in ascribing unrest to the presence of an inferiority complex in the mind of labour, then such other reasons offered to account for it as Bolshevik propaganda, drink, laziness, the housing problem, dissatisfaction with the government, with the profiteers, or with the result of the war, can be no more than superficially plausible or partially true. *The psychological law is clear: where there is continued unrest, there is fundamentally a sharp clash of instincts responsible for it; till this conflict is resolved, there can be no enduring peace.* Thus compulsory arbitration in the absence of the spirit of conciliation will be merely an artificial attempt at fusing sundered interests; you cannot force the spirit of reconciliation into existence, "No man can enter the kingdom of heaven by violence."¹

That our view is substantially correct is evidenced by the consensus of opinion behind the following quotations, which, we think, will be accepted by most readers as authoritative:—

Mr. William Adamson, chairman of the Parliamentary

¹ Speaking of industrial strife, Professor Sidgwick wrote in his essays, *National and International Right and Wrong*: "There is no kind of strife to which the application of the method of arbitration appears at first sight more reasonable, or is more commonly demanded; but there is none in which the nature of the case ordinarily presents greater obstacles to the satisfactory application of it. The difficulty here is not so much to find an arbitrator adequately free from bias as to find principles of distributive justice which the common sense of both the classes concerned accepts. This is a difficulty that seems to reach its maximum in the present state of society, which is distracted between two opposing ideals.

Labour Party, told the business men of Glasgow that one of the principal causes contributing to industrial unrest was the co-existence in the community of those with unlimited wealth and those in abject misery. We quote this opinion to illustrate our point that labour is not always completely aware of the psychology of its own mental condition. There have always been rich and poor, but poverty is not unbearable, even when compulsory, *unless the poor are brutally reminded of their inferiority so that resentment is positively aroused*. It is not so much the want of wealth as the contemptuous assumption of some that there *must* be poor. To the worker, ceremonial discipline emphasized, for example, in the addressing of the employee by his surname and the need for the cap-in-hand attitude of reply, in the first-class railway carriage, the luxurious motor car, the furs and the diamonds of the theatre parties, and so on, are eloquent to him of a desire for his own continued inferiority. They do not annoy the unembittered. There are other factors to be found which are responsible for our unrest, not the least powerful at present being the reaction of the masses from the apparently futile idealism of the war-period; but these factors would count for little if they were not continually reinforced by the thwarted or distorted emotions which are kept stirring in the inferiority complex.

Bishop Gore gave his opinion recently upon the servant problem, which in one way reveals to us the whole problem of capital and labour in miniature. He ascribed the lack of recruits for domestic service to the fact that the common opinion that there were two classes of people, the mistress class and the maids, was being challenged. There are no masters by divine right, he said, and in the future there would be no privileged class. Why, it may be asked, have we had to wait till now for this challenge? Because to-day the contrast between luxury and want rankles in the minds of the poor, who have at last received the rudiments of an education, as it never did before.

Mr. Sidney Webb at Oxford in April last put the psychological case with equal plainness. Philanthropy and welfare schemes, he declared, would not in themselves allay arrest ; and this, he said, explained why some employers were pained by what they regarded as the ingratitude of their workers. As the workmen saw it, good wages, short hours, welfare and considerate treatment were no better than the good treatment of a horse, so long as they were denied a *status* in the direction of their own labour.

Lord Haldane, in his address this year (1920) to the Co-operative Educational Association surveyed the problem of unrest from the point of view of education, and said in the course of his speech :—

I have come to the opinion after a good deal of study, that the chief cause of the sense of separation between rich and poor arises not so much over questions of wages and hours and social surroundings, as over chances of education. The man who feels that he has it in him to have made a fuller use of his faculties is *embittered* if he thinks he has been denied the chance of doing so by being shut out from the training that has been lavished on *many whom he sees to be by nature inferior to himself*. (Our italics.)

Let us quote next from a lecture delivered by Professor J. B. Baillie in the Industrial Administration Department of the Manchester College of Technology last year. Except that he does not so strongly emphasize the fundamental importance of the inferiority complex in motivating unrest as we do—and until the similarity between social disorder and abnormal individual mentality is more clearly realized there cannot perhaps be such emphasis—his view and ours substantially coincide.

The apparent or real accident of fortune which places one man at a disadvantage or in a condition of inferiority to another in obtaining a livelihood, and which turns one into an employer and another into an operative, cannot but stimulate into activity the dormant passions of jealousy, envy, suspicion, and distrust with which human nature is endowed. It is useless to close one's eyes to the fact that these passions, however they originate in special

circumstances, are inseparable accompaniments, and are partially causes of industrial unrest. The division of the industrial world into employers and employees, masters and men, inevitably gives rise to separation of interests, to class consciousness. The distinction is kept up by all sorts of conditions, some natural and reasonable, others artificial and arbitrary. The division between the two becomes accentuated by each seeking its own interest and advantage at the expense of the other, by separate forms of education and manner of life. They rarely meet except to bargain or to give and receive orders. Their minds tend to become alienated from one another. Understanding and sympathy are easily broken, or in extreme cases lost altogether. Yet the two are inseparable in the enterprise of industry.

Finally we must quote Mr. D. L. Thomas, the chairman of the Welsh Housing and Development Association, who writes with marked psychological insight in an introduction to *Pithead and Factory Baths* in putting forward the view that the social advantages of a pithead system of baths far transcend the merely utilitarian.

Cleanliness is an essential part of decent living (he says). If in the streets and public conveyances workmen, on returning from work in dirty clothes and with blackened faces, habitually meet other people with clean exteriors, consciousness of their own outward condition is bound to react injuriously on their minds and character. Their self-respect, especially if they form a minority of the population, is bound to be undermined, and they are less likely to have a due regard for the decencies and courtesies of life. They are apt to believe that other people look down on them as if they belonged to a Helot class. They may therefore be tempted to live on a level which corresponds with the low estimation in which they suppose they are held. On the other hand, if they are in a majority, their wounded self-respect may occasionally lead them to over-assert themselves at the expense of other sections of the community. In either case their very nature, as human nature always does in similar circumstances, reaches out, however unconsciously, for some compensation, some *quid pro quo*, for the slight which their occupation casts upon them in the sight of their fellow-men. In the one set of circumstances self-assertion or class-assertion may supply the compensation which their nature demands; in the other self-indulgence may afford them an escape, temporary though it be, from such sense of degradation as may spring from their environment or occupation. Without pursuing

150 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

further this "philosophy of clothes," I wish to suggest for serious consideration whether the "colour bar" of the mining industry is not largely responsible for that spirit of sectionalism and of clannish trade-consciousness which seems to exist among the miners in a greater degree than among other workers. Their begrimed condition in returning from work, many of them having to travel considerable distances in doing so, must have a subtle but potent *psychological effect* in making them feel themselves a class apart, with interests that differ from those of all others around them. This is something different from the ordinary class-consciousness of the working-class Socialist, for it leads to over-emphasis of the interests of the men working in the particular industry or even in the particular colliery, and to the ignoring of the interests of those engaged in other industries or even other collieries, not to mention those of society at large. It is a narrow trade-consciousness, not the class-consciousness which recognizes the solidarity of all labour. In this way miners often bring upon themselves a great deal of obloquy, and lose the support of public opinion, by pressing in an unreasonable manner—such as by means of down-tools strikes—claims that may be entirely reasonable, thereby giving the impression that they are indifferent to the loss and inconvenience which their action may cause to workers in other industries or to the public generally, provided they succeed in getting what they want for themselves.

If the "colour bar" were strictly confined to the place where the industry is carried on, if there were neither excuse nor opportunity for thrusting it to public notice in the streets, there would be less tendency on the part of miners to regard themselves as a class apart, there would be less false antagonism of interests, and a less self-regarding social consciousness might be expected in time to manifest itself in their ranks.

The fundamental problem confronting us to-day, then, would appear to be that of eradicating the suspicion and class hatred which are poisoning our civilized life. Once they are removed, then industrial unrest as a perennial source of anxiety will disappear too. In the case of an individual mental disorder the physician finds it necessary, before the patient can achieve that frank self-understanding and transvaluation of personal values which are the essential preliminary of a cure, to penetrate beneath the symptoms and the apparent causes of the trouble into the deeply rooted but disturbed emotional life, where

the fundamental energies of his being, the instincts, act and interact. Let us, therefore, in the manner of such a physician pass to a short consideration of man's instinctive and emotional life as it is manifested in industry. A study of this aspect of our problem will at least supply us with a method of distinguishing between remedies suggested which are worthless and those which may prove of enduring value.

ADDENDUM

The following extract from a daily newspaper of August 1919, would seem to suggest that the concepts of abnormal psychology, *mental conflict*, *repression*, *the censor*, etc., will prove equally useful if applied to racial problems :—

AMERICA'S RACE CONFLICT.

"The deadly feud between white and blacks, which has been productive of so much bloodshed in Washington and Chicago in recent days, appears to be growing in intensity," says the *Glasgow Herald*.

"With the blacks there can be no question of fusion. Nominally they are American citizens. But in spite of constitutional amendments, they are denied political rights. The Labour Unions will not admit them to membership. The colour bar is immovably fixed between them and the social life of the white community. They may not break bread in public with man or woman whose skin is of a different hue from theirs, and miscegenation and its unhappy products are abhorred unto the third and fourth generation.

"In effect there are two Americas. There is the America which we know as the virile cousin of all the races of Europe, alert, resourceful, generous, enthusiastic, brimful of political ideals, eager in political experiment, more than half willing to believe that it is an elect people whose destiny it is, as befits the heir of all the ages, to excel the grandest achievements of the human family in art, literature, and science. And there is the America which is unknown, except as a dark background to the energies of a mighty nation, the America twenty millions strong or thereabouts of which we get humorous or pathetic glimpses in verse or story, but for the rest is a cipher or a problem, according as we choose to throw it an indifferent glance or pause for a moment to look at the impassive countenance of the poor drudge, the black Cinderella of the American household. Well, it is the problem and not the cipher that is going to count."

Strangely enough, since the above was written and the addendum made, the news has come from America that the American Federation of Labour has removed the colour bar and admitted the negro to trade union membership. This is a step of great significance to those who believe that the progressive integration of conflicting interests is the surest way to a fuller life.

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§ 2. THE SPRINGS OF CONDUCT

For more than one reason a psychological analysis of the motives and purposes to be observed functioning in industry is desirable. We have already suggested that the cause of the long-drawn-out antagonism between the workers and their masters may originate in the conflict caused by the failure of the latter to appreciate to the full the complexity of the motives which impel us to industrial activity ; in an ignorance, even, in some cases of the fundamental nature of driving forces which animate our simplest endeavours. The analysis which we need will reveal the elementary impulses out of which the more complex tendencies are developed.

But not only for the sake of a deeper understanding of the causes of unrest do we need such an analysis. Normal industrial activity as well as abnormal activity must be carefully studied, for the great problem confronting the modern works manager, after he has installed in his workshops all the latest mechanical devices and the newest methods and processes of manufacture which science and skill have together contrived, is to discover incentives which will set in full operation the normal energies of the workers. Few such incentives have been found capable of getting men to keep pace continuously with the possibilities of machinery. Even when no serious unrest exists, management is, therefore, dependent upon some sort of psychology, systematized or unsystematized, for a knowledge of the means by which the fundamental springs of human activity are usually released. Indeed, in this connection it may be said that the more com-

pletely fool-proof machines are made, thus obviating the need for ingenuity and alertness on the part of the worker, the more will it be necessary for us to study the art and science of galvanizing into lasting efficiency the human beings who are to perform these processes and tend these machines. If, then, we should be tempted to regard man as himself nothing but a machine, just a little more intricate perhaps than those to which he is frequently an almost automatic attachment, we should still need to know how to release his energies for operation and maintain them in working efficiency. Thus, to discover the sovereign remedy for unrest, and to find incentives able to keep men steadily at work, is, therefore, a single problem of which each part is but the complementary aspect of the other. In fact, to solve satisfactorily either part of the problem is to solve the whole.

Many systems of philosophy, ethics, politics, commerce and industry have been based upon an unsatisfactorily narrow psychology, which has inadequately reflected the wide range of expression humanly possible. We must distrust this type of psychology. It will be recalled by the reader that a complete system of political economy was based upon the assumption that man in all his actions is motivated principally, if not wholly, by the simple desire to further his own interests. The unrestrained functioning of self-interest, as we see it in the baser forms of competitive industry and commerce, is the direct outcome of the spread of this sort of philosophy. The greatest intellectual fillip which the doctrine received, perhaps, was administered by the nineteenth-century biologists when they took up the Darwinian hypothesis with the zeal of apostles, and set out to prove that progress could universally be traced back to the all-dominating struggle for existence which has always ended, and will end, in the "survival of the fittest." "Natural selection" of the fittest was popularly supposed to result invariably in the survival of *individuals* who were stronger or cleverer or more fortunately placed than their fellow creatures.

A strong spice of self-interest has obviously a high survival value, if this be true, and those who are lacking in the quality are doomed to disappear in the further evolution of the race.

It is not difficult to supply numerous illustrations for a startling and terrifying picture of nature "red in tooth and claw" which will point to the universality of the struggle among individuals for self-preservation. But all the facts do not point in this direction. Yet throughout the ages those men and women who have sought to base their philosophy and the conduct of their life upon other principles have as often as not been derided and ridiculed as cranks by the majority of us. There have been thinkers, however, who have felt that the life-record of a Buddha, or a Socrates, or a Jesus, or a Joan of Arc, though an apparent testimony to the falsity of the current opinion about the absolute importance of self-interest, could hardly be explained as wholly expressive of a delusion or some other abnormality—and this seemed to be the only alternative—and so they have tried to show, not that the principle of explaining all our actions by reference to self-interest is wrong, but that virtue and heroism, unselfishness and tender regard for others are in reality, when properly understood, as completely motivated by self-interest as vice and cowardice. In this way they would seek to explain the habitual self-sacrifice of parents, the righteous indignation of the prophet against those who despoiled the widows and the fatherless, the dying renunciation of Sir Philip Sidney, or that last walk in the Antarctic darkness by Captain Oates.

Fortunately, at the same time as the gospel of human salvation through struggle and self-interest was being trumpeted abroad, the complementary gospel of *mutual aid* and the naturalness of co-operation was being quietly re-written¹ in our midst by a Russian exile, Prince Kropotkin, and fellowship and solicitude were being shown even in the animal world to be as natural and useful as self-

¹ See *Mutual Aid*.

interest in determining motivation. Thus, one cannot possibly account for the voluntary enlistment of five million men for war service—to give a recent example of this spirit of mutual aid—by ascribing the phenomenon wholly to the promptings of individual self-interest. Even the most hardened cynic must have discovered a few cases of the deliberate choice by free men of danger and hardship; while to gloss over these instances by calling in the factors of impetuosity and imitation as aids to explanation when self-interest is not at first sight apparent is to point just as directly to the presence in human nature of tendencies which are as likely to function in animals and normal men and women as the more purely self-regarding instincts. To-day, then, every well-considered psychology has room for both self-interest and self-sacrifice.

As another example of the irrational tendency to ascribe the whole range of human conduct to the operation of a single simple motive in human nature, we have had a new psychology from Central Europe. Sigmund Freud, a medical psychologist of unrivalled insight whom we spoke of in the last section as having contributed concepts of the greatest importance to the elucidation of abnormal mental phenomena, discovered that the source of the vast majority of the neurotic and hysterical symptoms of the people who consulted him as a specialist was clearly and unmistakably to be seen in a starved or distorted sex life. Now, what is true of the abnormal may not be wholly and invariably true of the normal; nevertheless, in the last two decades we have witnessed a complete re-interpretation and re-valuation of the entire catalogue of our human emotions and aspirations by uncritical followers of Freud, who have tried to explain them as the expression not of a general desire for self-interest, but of the single specific desire for sex-expression. Darwin, Napoleon, Shakespeare, Leonardo da Vinci, Joan of Arc, the saints of the Christian Church, art, music and literature, morality and religion, have all been exhibited in turn as

but flowers upon the all-too-human tree which has its roots in the sexual. The tendency to over-emphasize sex as the universal explanatory principle of normal human behaviour will no doubt weaken in the same manner as the tendency is weakening to call in self-interest to our aid whenever we have a human problem to solve.

Here, again, the recent world war has provided us with an illustration of what is likely to be seen eventually as the fuller and deeper truth. There have been supplied for our attention almost countless examples of mental derangement due not so much to thwarted sex-life as to the insufficiency in strain and emergency of the *will to endure*. We see to-day quite clearly that in such times of stress we are apt to become dominated by any or all of the primitive emotions and instinctive energies in turn, and especially by *fear*, which has great disintegrating force. Individuals who are educated in the best sense of the word are usually able to control the functioning of these primitive emotions owing to their habitual attention to ideas and objects worthy of respect, and to their habitual concern for things of intellectual and spiritual value. The possibility of primitive instinct functioning healthily and safely is secured most satisfactorily through the possession of ideals and principles. But continuous application to tasks involving a high degree of self-compulsion induces, as we have seen, a fatigue in the higher levels of the mind, and in the absence of strength and vigilance on the part of the "educated self" the "primitive self" bursts through into expression. Painful memories, too, surge up out of the forgotten past, while the anxieties of the present resist suppression. At such times reason totters on her throne.

Neither sex, then, nor self-interest is the complete explanatory principle we seek, though they frequently are at the roots of much of our mental trouble; it is rather in the failure to control or in the thwarting or distorting of *any* of our fundamental innate tendencies that we must look for the explanation of unrest.

In the last section it was suggested that labour's attitude to traditional scientific management was to a large extent not consciously but unconsciously determined, and consequently could not be completely represented in the form of logical proportions which would gain even its own assent. That is to say there are grounds of action which may never become either rationalized or consciously recognized. But a person who does not deliberately reason out his actions may not be unintelligent. The motor-car driver, for example, who sees a child rush out before him and deftly swerves aside to avoid an accident acts with unquestionable intelligence, but he does not consciously reason step by step, "There is a child—I must avoid him—if I turn my wheel a little to the right (or left) it will be sufficient to take me safely past him," and, moreover, the driver's own account of why he acted as he did would probably be nothing like an accurate description of what really took place in his mind. In the case of the skilful driver such an avoidance of collision would be almost automatic and probably devoid of any mental colouring.

Similarly, the instinctive oppositions of workers to details of management, and of management to labour organizations, frequently flash out uncontrollably into expression, and only afterwards become rationalized, that is, endowed with the appearance of an action which has been deliberately thought out step by step. It is most essential, however, that management should not allow itself to think that any action not carefully planned by the workers springs from the promptings of impulses which, because they are unreasoned, may in the long run safely be ignored. The modern teaching about human nature indicates that all the effort of which we are capable depends in the last resort on the unreasoned impulses of our instinctive nature. These supply the dynamite with which we may blast our way through opposition and difficulty. They are the forces which, when our mental life is in a condition of anarchy, drive

us from pillar to post, and finally into hopelessness and despair. Yet, nevertheless, under guidance they can lead us from success to success. Often they operate unconsciously or before consciousness can intervene, so that they easily escape detection until beyond control; but a manager who acts as though what cannot consciously be expressed does not exist will be thought, as we grow more enlightened, just as incompetent as his predecessor who imagined that all discontent as well as all efficiency could be explained by reference to the abnormal or normal functioning of the single motive of self-interest. This judgment will perhaps appear harsh, but it may well be that the continuance of our civilization in the days of difficulty before us will depend upon a subtle acquaintance with and an intimate understanding of the moods and resentments and aspirations of labour, all of which are instinctively rather than rationally determined, and, when destructive in their tendencies, upon a masterly and sagacious anticipation by management of their more impulsive forms of expression.

§ 3. GREGARIOUSNESS AND GROUP LIFE

What is the normal development of the instinctive tendencies which when baulked cause so much individual and social unrest ? A study of the evolution of purposive behaviour reveals to us several marked stages, though with infinite gradations between them. In the presence of effective stimuli the lowest forms of life are characterized by two fundamental activities of an almost mechanical kind, the "tropisms" of attraction and repulsion. But gradually the part played by active life during the slow march of evolution becomes more and more pronounced, and after a while intelligent spontaneity of response is to be seen in and behind the mechanical reactions. Attraction and repulsion, that is to say, begin to wear the first marks of behaviour and merit the names of appetition and aversion, so that as the life of the organism increases in point of quality and strength, becoming at the same time both diversified and more and more integrated, the environment is not only reacted to, but it also becomes an instrument of self-expression and purpose ; we see in addition to the "fixed end" an ability developed to pursue it by "varying means." Life masters the performance, that is to say, of a variety of responses and methods in its appetitions, and to a lesser extent in its aversions.

As soon as the developing organism becomes aware that it is not alone in its search for food, and that other organisms are seeking the same ends as itself and endeavouring to avoid the same dangers, the gregarious or "herd" tendencies begin to take form and develop ; that is, we may observe the instinctive reactions becoming

to some extent modified, so that they take on an *other-regarding* in addition to a *self-regarding* character; under the influence of herd-consciousness, therefore, several further differentiations of the root-impulses of human nature become possible, and accordingly take place. Thus gregariousness, by rendering adaptation to environment necessarily more complex, determines to a large extent the mental growth of all the higher animals which come under its influence. Living happily among others, that is to say, demands greater intelligence than living alone; yet animals and children, and men and women, grow to like living together, and normally resent being isolated, in spite of the antagonisms which may arise through social intercourse.

It is the herd-consciousness which is dominantly active when the young child cries at having to leave the warmth and intimacy of the fellowship of the family circle and go to bed by himself, and it is much the same resultant feeling of uneasiness which makes tedious the night-watch of the sentry who stands alone at his post while his comrades are either indulging in revelry or are soundly asleep.¹ The tremendous growth of cities and the increasing popularity of work which takes people into busy centres of social activity, such as the factory and the business house, is not wholly to be ascribed to the lure of comparatively high wages or of the more subtle seductiveness of town pleasures. The countryside becomes emptied of its inhabitants partly because of the lack of housing accommodation, but also because of

¹ The reader who wishes to gain a fuller idea of the extent to which gregariousness affects our mental life should read Mr. Trotter's illuminating book on *The Instincts of the Herd in Peace and War*. To quote a relevant passage: "Another very striking piece of general evidence of the significance of gregariousness as no mere late acquirement," he says, "is the remarkable coincidence of its occurrence with that of exceptional grades of intelligence, or the possibility of very complex reactions to environment. It can scarcely be regarded as an unmeaning accident that the dog, the horse, the ape, the elephant and man are all social animals."

the decay of the traditional amenities of social life and the absence of new customs and amusements, to replace the old, capable of competing successfully with the larger opportunities of intercourse offered in cities. Unfortunately, the world-currents of modern civilization¹ whirl by and leave the stagnant countryside unrefreshed. But the longing for the more primitive life of the herd and its enfolding protection cannot altogether be suppressed. The solitary life is not natural. More and more we are finding it difficult to get people to accept and hold for any length of time occupations which automatically cut them off from social life. It is not surprising, therefore, that the lighthouse-keeper spends but a few years in his splendid isolation before taking a pension, or that town-bred girls rarely become general servants, because, in addition to objections they might raise to a life of "servitude," the lonely life of the kitchen, intensified as it is by the long hours which must be spent there, is too much for them. To-day practically all our servants are being recruited from the countryside, where individuals have become more or less accustomed to comparatively uneventful existence. Yet most of these girls grow restive after a time, in their half-way advance towards complete immersion in the stream of social life, and are drawn off ultimately into what is for them the more stimulating current of factory life.

There is no fundamental reason why an industrial civilization should be based mainly on city life. It happened, unfortunately, in this country that the Industrial Revolution was in full movement before transport

¹ "It is common to speak of the temptations of great cities; it would be more true to speak of the infinite uplift provided by the spectacle of effort all round. . . . To pass from office to street, from shop to theatre, from Westminster to the Inns of Court, is like being in the centre of a magnetic storm. It is truly the greatest magnetic storm ever experienced on this planet, this city life, for the electrical flow that carries our messages is nothing beside the human will-to-live that eddies all round" (M. P. Willcocks, *The Man of Genius*).

facilities had developed to any extent. To be nearer their work men went into towns to live who might have been content to dwell in their native rural surroundings, had there been railways to take them backward and forward. It may be that in the future there will be an attempt made to de-urbanize communities in such a way that men and women can live and work together without losing touch with nature.

Even in our colonies, where there is perhaps more individualism and independence of spirit than in the home country, the majority of the people live in towns. Thus in Australia half the total population is to be found in five cities. In the United Kingdom 75 per cent. of the population is found in towns and urban areas. Workers in new lands when placed beyond the pale of civilization find the tension of their life extremely wearing because so unnatural, and feel compelled frequently to return to the towns, there to undergo a period of violent reaction, during which the emotions which have been denied an adequate outlet burst through in the most primitive fashion into a delirium of expression. The lonely life of the night-watchman, too, is usually found irksome and falls accordingly to the lot of the less intelligent, while until recently the railway signalman has had to spend far too many hours apart from his fellow men. The writer knew well a wireless operator who was stationed on a lonely islet in the Pacific. He was the most genial of companions, and on account of his generous and considerate disposition had been thoroughly popular. He married an American girl from a western coastal town, and they went back after a holiday to his quarters. At the first opportunity the girl returned to her mother to stay permanently with her, declaring that she could never again face the appalling isolation of her husband's life.

We have made cruel use of this fear of loneliness in organizing our prison system, so that it was not difficult for Mr. Galsworthy in one of his plays ¹ to give us a

¹ *Justice*.

painful description of the bleak horrors of solitary confinement in a prison cell. Our very figures of speech testify to the unpleasantness of the lonely life. We speak when we have been neglected, for example, of being "left out in the *cold*," and we long for the "*warmth* of friendship"; we describe the affection which unites men and women as *sweet*, and envy which divides them as *bitter*; moreover, to live alone is *hard* and *rough* on one, whereas to live among friends makes one's path in life *smooth*; and so on.

One of the characteristic forms of human self-expression natural to gregarious life is conversation. It is desirable, then, that when people work together conversation should not *forcibly* be suppressed. A keen interest in work will frequently make conversation undesirable, so that when there happens to be an undue amount of conversation during working hours the problem of getting rid of it should be tackled indirectly through attempts to increase interest in work rather than directly through penalties and fines. All the tactics of management should be planned to strengthen the "common purpose" which unites men and women engaged together at the same work: it is fatal to centre by repressive measures the bond of the workers' unity in a sense of injury. Indeed, whenever an ordinary manifestation of normal human instinct is met by management with flat opposition, then it either takes on a fighting form with the potential support of all the emotional energy of the personality, or it sinks back defeated, leaving the workers disturbed and irritated, and in ripe condition, to change the metaphor, for falling under the influence of others who are discontented.

To those employers who find mass-action a repulsive method of expressing crude animal passion one ought to say that there is no reason whatever why the bond of unity among the workers should consist of a common grievance. Perhaps there is room and occasion for a differentiation of the meanings of the words *crowd*, *mob*,

group and *community* to express the idea that what unites people varies according to the occasion. A crowd, as most observers would agree, is a loosely-knit-together heterogeneous collection of individuals with a *variety* of interests, but a *single* commonly-experienced emotion will convert them instantaneously into a mob. A group, however, is the crowd united not by crude feeling, but through devotion to a common interest or principle, so that emotion in the group is healthy and the end pursued calmly and deliberately chosen. In the community, amid a variety of conflicting interests, there is still a real bond of unity, and that bond is the common culture and civilization. Thus the community is more complex in its unity than the group. Those who have entered intimately into the common experiences of the group and of the community usually find the satisfactions of mob-life ephemeral. For the manager, then, who dislikes the mob, the way to counteract its evil influences is to organize groups of various kinds within his works, or better, to encourage his workers to join suitable clubs, circles or societies outside. The impulse to gregariousness will not discharge itself safely and completely in the annual outing, though it will find great satisfaction thereby. The gymnasium, the sports clubs, the reading and sewing circles, the dramatic, musical, and debating societies and the educational classes will alone in the long run draw the vitality from the mob-activity, and give their participants that sense of personal worth and responsibility which stabilizes emotion and tranquillizes life.

It is the herd-feeling which is the cementing agency responsible for labour solidarity, and it is because the tendency to impulsive and unthinking group action is strongest among those who feel that they most need protection that Taylor and his less discriminating followers of the early scientific management movement were wrong in ignoring it or trying to break it down when it took the form of unionism. In this country

we have rightly accepted even organized and deliberate group action in the form of Trade Unionism as a natural and healthy thing, and we have rightly decided that it must be utilized and developed rather than opposed.

It is to the fear, too, of being cut off from their fellows, which few can withstand, that we must trace the support given to a strike policy. How often do we meet the individual railwayman or the miner on strike who declares that he is not altogether in favour of what his comrades are doing, though he must support them, since it is distinctly unpleasant to be called a *blackleg*. We are apt to argue from this sort of example that the "wicked agitator" is at work persuading men to strike against their will. Such explanations are ludicrous. As a conscious personality, the worker may attempt to rationalize his awkward position in the face of public criticism by a pretence of lukewarmness and even believe himself in his apology, but what usually motives strikes is no rational conscious conduct, but the unconscious forces of group solidarity. In the above example we have a distinctly pretty illustration of the behaviour of persons who, belonging to more than one group, fear losing kinship with any one of them; consciously, therefore, they fraternize with one (the community), and unconsciously with another (the labour union); but in times of stress the stronger unconscious sympathies are always on the side of rebellion, as a study of the abnormal has led us to expect.

It is interesting to notice in this connection, too, that decisions to mass action are frequently taken to-day at big meetings where, because they are positive in nature, suggestions of the possibility of giving vent to grievance through a strike generally spread with almost electrical suddenness and force. Reason stands little chance of holding its own when grievances backed by strong emotion are given an outlet into expression. The speech of Mark Antony in Shakespeare's *Julius Cæsar* has no doubt been well pondered by every successful demagogue who understands how much easier it is to work upon the

feelings of individuals in crowds than upon the same individuals singly. In all industrial disputes (and in all political elections) we should get a truer reflection of the intelligence and reason of voters if mass meetings, public appeals, and canvassing were dropped entirely for two or three days before the individual voters' decisions were made. The increasing use of the ballot in connection with a strike policy is, however, even under the worst conditions an improvement on the method of leaving the decision to delegates who are overwrought by the excitement of interviews and debates and public meetings, and consequently find a clear positive decision in favour of a strike a real relief.

It is to-day, then, a truism that man's mental reactions to his work cannot be completely explained if he is regarded merely as a self-contained unit. In seeking to further industrial efficiency we shall be forced to take into consideration the important fact that, even as an individual, the worker can only be satisfactorily studied in connection with the web of relations in which he lives and moves. Throughout history man has always found his chief means of self-expression in work that is of social value, and has never lived happily apart from some definite group to which he could voluntarily yield homage, and from which he might derive emotional satisfaction and inspiration. In the past it has been mainly through kinship groups, through church or political party, through territorial or occupational association that he has drunk deep of the fuller and more enduring pleasures which are to be found in group-life. To-day the trade union, even if it does not provide the satisfactions, is at least the group in which the largest number of men and women participate. As McDougall says,¹ "almost the only condition of wide and general influence that continues in times of peace to foster group self-consciousness is occupational association."

Not every kind of group association is ennobling, how-

¹ *The Group Mind*.

ever. It has frequently been observed that individuals of marked intelligence who enter wholeheartedly into the life of crowds often become brutalized and degraded. Groups which are lacking in organization are frequently goaded by oppression or incited by demagogues into violently impulsive action characterized by the coarsest of emotions, so that they commit excesses impossible to the unit members acting separately. Before the era of our modern trade unions such mob-action finding expression in sabotage and outrages was the usual accompaniment of industrial disputes. Through the influences set in operation through well-organized trade groups such fickle emotionalism as characterizes the mob may be moderated and refined. Group-life at its best, that is to say, stabilizes and civilizes the individual. Those who would make an end of trade unions forget that without them we should regress in times of industrial crisis to unregulated mob-action of the worst kind.

There are five conditions, according to McDougall,¹ which favour the progressive development and integration of the mental life of the unorganized crowd, and in so far as these may here be exemplified by the conduct of our English trade unions we may summarize them:—

1. In the first place some degree of continuity of existence of the group is necessary if fickleness of impulse is to be overcome.

Now the authors of *The History of Trade Unionism*,² define a trade union as “a continuous association of wage-earners for the purpose of maintaining or improving the conditions of their employment.” This conscious development of a purpose is the ground of continuity, and the basis of all the other conditions of progressive growth.

2. In addition, says McDougall, some adequate *idea* of the group must exist in the minds of its members, and this must be coupled with the development of the sentiment of group-loyalty.

There were no trade unions of workers of a permanent

¹ *The Group Mind*.

² S. and B. Webb.

nature before the epoch of the Industrial Revolution, because journeymen had not accustomed themselves to think of the gulf between master and man as impassable for the majority. The division between the members of the community was more of a trade and less of a class division—it was vertical rather than horizontal; but with the divorce of interest effected by the factory system between the manual workers and their capitalist employers, and the gradual realization of the former that they could no longer hope to rise into the ranks of the employers as was previously the normal course, *class* consciousness became dominant. “Whilst industrial oppression belongs to all ages, it was not until the changing conditions of industry had reduced to an infinitesimal chance the journeyman’s prospect of becoming himself a master that we find the passage of ephemeral combinations into trade societies.”¹ The same authors tell us that only in those industries in which the worker has ceased to be concerned in the profits of buying and selling, which would bind them in interest to their employers, can effective and stable trade unions be established. The *idea*, then, of the trade union is the inevitable product of the divorce of interest between employers and employed. This idea is frequently enforced now through association in the workers’ minds with sick benefits and badges and frequent meetings and publications; indeed, it is difficult to-day for a worker to forget that he is a unionist.

3. Another condition favourable to the development of the trade union group is its interaction with other groups swayed by different aims and ideals.

Conflict and rivalry are notoriously effective in promoting group-consciousness. Whereas the economists are continually reminding us that the interests of all classes are fundamentally the same, party organizers who wish to develop party feeling never tire of emphasizing the conflict of interests between their own groups and others. It is because conflict is essential to the growth

¹ S. and B. Webb, *op. cit.*

of *class-consciousness* that trade union officials fear welfare work, Whitley councils, and co-partnership schemes. These tend to obscure the clear-cut lines between class and class. And just as the kings of old united their peoples by embarking upon foreign wars, so a strike to-day is not *always* unwelcome to the unionist as a means of strengthening labour solidarity when it shows signs of weakening.¹

But it is not wholly to the efforts of the labour union official that the existence of class-consciousness must be ascribed. Both Parliament and employers have played no inconsiderable part in evoking it. Up till the middle of the eighteenth century it was customary for both employers and employed to petition Parliament for redress when suffering from a grievance, and to feel certain of securing some measure of justice. Parliament, as we have said, acted as the conscience and reason of the community, and was the vitalizing force responsible for its unity and well-being. With the steady development of the Industrial Revolution, however, it found the task of maintaining a dispassionate attitude impossible, and drifted instead into a policy of *laissez faire*. It surrendered its duty of unifying and nourishing national interests to those able to manipulate its machinery. Class legislation followed. The Combination Laws of

¹ S. and B. Webb (*op. cit.*) quote from the narrative of a trade unionist who sketches the career of a typical union official: "Within the next three months the Branch Secretary finds that all that glitters is not gold. At least half of those who joined at the beginning have lapsed, and at times the branch looks like collapsing altogether. But by dint of much hard work . . . the branch is kept together until a time of prosperity for the trade arrives. This is the Secretary's opportunity to make or break his Lodge, and being a wise man he takes it. He puts a resolution on the agenda paper for the next Lodge meeting in favour of an advance in wages, a reduction of hours, or both. The next meeting carries it unanimously, and it at once becomes the talk of the whole trade in the town." The writer goes on to describe the stages by which the strike which is to revive the branch is then brought about.

1799-1800 made co-operation to improve working conditions a crime, and twenty years of persecution followed. Trade unions were forced to become secret societies with no open recognized means of self-expression, and consequently were driven to find satisfaction in sabotage and assault. (In 1834 seven farm labourers were transported for belonging to a trade union.) Thus the emotion which might have become the driving force moving the wheels of progress was short-circuited into revolutionary sentiment of the most dangerous kind. Not till 1871 were legal recognition and a status granted to trade unions.

4. A fourth condition favourable to the development of a marked group-consciousness is the existence of a body of traditions, customs and habits determining the relations of the members to each other and to the group as a whole.

We have already indicated our belief in the fact that the attitude of organized labour to-day is largely what it is owing to the influence of its past. The persecution and victimization of the early unionists are still powerfully (if only subconsciously) active in determining the labour point of view. A group consists of its unit members, but it has the power by virtue of its well-established traditions of moulding their thoughts and aspirations in accordance with the spirit of its past. Indeed, the attempt to modify any age-long custom or habit is usually painful and often abortive. The young unionist finds the customs, habits, and traditions of the trade group accepted to the full by his elders, and mass-suggestion and the dignity and prestige of age, in addition, impel him to accept them too. It is rare only that the newcomer can maintain for any considerable length of time a critical attitude towards what his superiors and elders respect, and the initiation ceremony which frequently precedes membership is designed to induce respect of the same kind in the most self-centred of individuals.

5. The last condition enumerated by McDougall as favourable to the development of a high degree of group-

consciousness is the existence of some form of organization involving the differentiation and specialization of functions among the members.

A certain degree of intelligence on the part of the workers is called for before the rudiments of trade union organization can be established. If oppression alone could engender group-consciousness and *maintain* it as a permanent thing, then we should find trade unions fast appearing in history among the worst-paid workers. These, however, almost always lack the mental virility and the intelligence necessary to organized action, so that it is the aristocracy of labour which is always foremost in aggressive combination.

The existence of organization prevents the rapid exhaustion of enthusiasm which has followed many of the "movements" of the past. Examples of this kind of phenomenon occurred in 1833-4, 1873-4, and 1889-90 in the industrial world. In these years sudden expansions of group-feeling took place among the workers; new members were enrolled in the unions by the thousand, but no means of canalizing their feeling into useful activity had been developed, and the new converts fell away from the faith almost as rapidly as they had rushed to embrace it.

The nineteenth century witnessed the gradual building up of trade union organization, accelerated eventually by the appointment of full-time officials. According to the authors of *The History of Trade Unionism*, from 1843 onwards there was a shifting of the leadership of the unions from the casual enthusiast and irresponsible agitator to a class of permanent organizers selected for their administrative capacity and business acumen.

It is for the future to decide how far trade unions will continue to move along the path of sectionalism. It is to be hoped that our further industrial progress may be ensured not through the deliberate destruction of the powers of the trade unions, but through a harmonization of the interests of the unions, of the employers, and of

the community. Men may belong to more than one group provided the aims of each do not clash, and a much richer and more enduring satisfaction is to be obtained from the integration of conflicting tendencies than by the abolition of any one of them. At present, while each industrial group is developing a consciousness of itself in its individual members, usually there is but a "conscious minority" which acts for the whole, and in so doing usually interprets only the aspirations of the particular group, and not the wider purposes which it possesses in common with other groups. The group of which we habitually feel ourselves to be members determines our point of view. If that view is sectional, then the value of bringing it into relation with others must be demonstrated. Solidarity cannot be achieved by the simple process of obliterating objecting parties. Unless, then, we wish to return to the days of mob-violence and blind unreasoning rebellion, we must assiduously forward rather than thwart the development of the labour unions: they are the cerebrating centres of working-class organization.

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§ 4. THE INSTINCTS IN INDUSTRY¹

The instincts of which we have heard so much since Prof. McDougall gave us his masterly presentation of their structure and function in the *Introduction to Social Psychology* do not act, as the uninstructed student might suppose, from a consideration of our metaphors, independently of one another and as self-contained units of energy which habitually master the total personality in turn; they are to be regarded rather as racial habits of reaction to the situations of life which have proved serviceable and been retained by the species in possession of them.² Their value for man lies in their use as a basis for further and more complex habits. A study of abnormal mental phenomena has laid bare an important fact which throws light upon their continued appearance among human beings in an undeveloped form.

Progressive adaptation to the situations of life calls for an increasing integration of effort and intelligence which taxes us to the utmost, so that in the face of exceptional difficulty, or even under ordinary conditions if we are "below form" or emotionally disturbed, we

¹ This is also the title of a suggestive book by Mr. Ordway Tead. Our opening paragraph indicates the extent to which we differ from Mr. Tead in our views of the subject under treatment.

² McDougall, *Social Psychology*, p. 29, defines instinct as "an inherited or innate psycho-physical disposition which determines its possessor to perceive, and to pay attention to, objects of a certain class, to experience an emotional excitement of a particular quality upon perceiving such an object, and to act in regard to it in a particular manner, or at least to experience an impulse to such action."

are apt to relapse to former and lower levels of efficiency. This phenomenon was called by Jung, who first noted it, *regression*. Thus, when a Devonshire farmer (who in spite of great difficulties had educated himself and among other things ridded himself of his local dialect) accidentally pricked his hand in a gorse bush while discoursing to a visitor in his best English on the glories of Dartmoor, he exclaimed "Damn the *vuzz*!" So, too, in learning an act of skill we are apt at times, especially if we allow ourselves to become annoyed at our lack of speedy progress, to settle down to making mistakes long since conquered. (See also p. 37.) These are particular forms of the general phenomenon of regression. In the language of a psycho-analyst like Jung life *regresses* to a more "infantile" form of behaviour when reality puts up too strong an obstacle to its progress, and in so doing it takes the inward path of memory rather than the outward and forward path of perception, re-animating the older channels of expression, revivifying past emotions, and re-issuing in racial impulse. Now, racial habit is more primitive than reasoned conduct, so that the instinctive reactions in their *crude* forms naturally appear when consciousness, either through sheer inability or because otherwise engaged, cannot design more effective forms of behaviour, and so *regresses*.

But the life-energy still courses in part in the old channels even when behaviour is rational: but the *outlet into expression* is notably improved and refined. It is essential, therefore, to the preservation of health, sanity and vigour that the original channels through which the main currents run are not in any way *blocked*. Development depends upon free and varied expression, and in so far as modern industry prevents this it is either dangerously diverting or damming up a flood which will eventually burst through its barriers and destroy what we treasure most.

The primary instincts which we shall deal with in this section are the simpler instincts of pugnacity (and its more playful form of rivalry), ownership, tenderness,

self-assertion (or self-display) and self-abasement. Other instincts—sex, curiosity, and constructiveness—we shall notice later.

Like many other men, F. W. Taylor realized clearly the value of the support of instinct in attempts at increasing efficiency. Unfortunately, he concentrated his attentions upon the impulse of rivalry (according to McDougall a differentiation of self-display and pugnacity), for by so doing he could not only increase individual efficiency, but also get rid of the monster which so often threatens management in the shape of mass-action. Now, to cultivate one instinct exclusively is to endanger the mental synthesis which depends on the balanced development of all the instincts.

Those men and women who come into close contact with some of the more pathological forms of the impulse of rivalry as they are to be seen at their worst in the meaner types of competitive commerce and industry, where they often find expression in practices which are subversive of morality and social order, are frequently inclined to argue for the complete extrusion of the impulse from public life. They frequently construct in their imaginative moments fantastic ideals of a co-operative commonwealth in a golden age that is to be when commercial competition will no longer exist. To aim at an improved society is good, but it is impossible, even if it may be desirable, to root out entirely from human nature a fundamental impulse. Moreover, there is now available enough evidence which can be drawn from our experience of crime and drunkenness and insanity to demonstrate the futility of running counter to certain native impulses. To neglect to cultivate a weak native tendency leads to its decay; to act as though a strong one does not exist or to seek to repress it is to rouse up an enemy against oneself.

If, therefore, anything must be said in disparagement of the Taylor differential wage system, and other premium plans of a similar kind, it is not because they are altogether

bad on account of their appeal to one's selfish desire to excel above one's fellows by *whatever* means are available, but because in so many cases they *over-emphasize* this particular desire, and ignore other motives which certainly ought to be excited into functioning.¹

The acquisitive or ownership instinct which is manifested in those of our activities designed to give us possession or control of such things as bring some form of satisfaction is also a powerful incentive in us, but it does not function solely through the desire for wealth. Almost every attempt at practical "communism" has broken down in the past through the failure on the part of an unregenerate few to deal rationally with their desire for individual ownership of the things which have been declared "common." The failure of bureaucracy in our own time can be partly accounted for by the strength of the desire in all of us for personal possession and material advantage, and the relative weakness, in case of a conflict of motives, of the desire for the public good. In the organization of a public service or a big business we shall need, till the race as a whole is highly educated, to employ the wisdom of the serpent as well as the innocence of the dove; we must contrive situations, that is to say, in which paths of "low resistance" to virtue are created, so that it will be to the advantage of each and all to see that justice is done.² For this reason the Gantt bonus system which made it advantageous for the gang-

¹ Though the impulse to rivalry, as it is found in the strongest individuals, is a powerful lever frequently utilized by the manager intent on speeding up work, the feeble-mindedness of the low-grade worker who is lacking in control of the impulse is equally exploited for the same ends. "Strong in the back but thick in the head" is a phrase often applied to this type of worker by his associates. See also footnote, p. 104.

² "The assumption that the stimulus of imminent personal want is either the only spur or a sufficient spur to productive effort is a relic of a crude psychology which has little warrant either in past history or in present experience" (Tawney, *The Sickness of an Acquisitive Society*).

boss to help his workmen, and so benefit not only himself but also every one else concerned, is the type of situation which we should aim at standardizing. The crowning disgrace of any society is, as it has often been said, that its citizens find the wages of virtue less than those of vice.

In conjunction with another native tendency, the protective instinct, it is the instinct of ownership which leads workers to identify themselves in an intimate manner with their tools, equipment, and machinery. One is more confident in dealing with what is familiar than when handling strange material: in this case "familiarity breeds contempt" of difficulty. The typist or the seamstress will work better on a machine which she uses habitually than upon a succession of others equally good. Moreover, we grow fond of what we use constantly and take greater care of it: thus we derive a double satisfaction from the emotions aroused in the functioning of both the instincts of ownership and tenderness. Union is strength. The more effectively a course of conduct will provide satisfaction for several emotional tendencies, therefore, the more frequently will it be repeated and the more difficult to break down.

Other instances may be quoted of the intimate manner in which actions productive of satisfaction for the ownership and the protective instincts are connected. Mr. Tead tells us ¹ of a spinner in a yarn mill who, when asked to change from some "frames" on which she had worked for several years, left abruptly without any explanation. In another case, when, in order to cut down the length of the working day by an hour, it was decided to employ some stablemen to tend and clean the harness of the horses which were under the control of some truck-drivers, objection was raised by the latter because they wanted to look after their horses themselves. We met an engineer recently who had been employed at a cotton mill for twenty years and had never taken a holiday during the

¹ *Op. cit.*

whole time, though entitled to a fortnight annually with pay, because he could not bring himself to give up the charge of his engine to any one else. In a large foundry a strike was brought on because a new foreman had decided to change a man from one forge, which he had come to regard as his "own" workplace, to another. In this connection the old proverb that new brooms sweep clean expresses only half the truth, the other being that they often stir up a great deal of dust that might better be left settled.

An indignant sense of injustice, maybe irrational, is invariably aroused when management fails to allow for this consciousness on the part of the workers of the ownership of their jobs. Thus the police who were dismissed from their employment last year still feel that they were cruelly and unjustly deprived of something which actually *belonged* to them in the same sense as their homes and their children. So, too, the resentment against some one who has come in as an intruder to steal work which is the right of another.

The right of ownership has not yet been carried to extremes by workmen: whether employers have been equally moderate is less certain. Throughout the centuries preceding the present, manufacturers steadily and even blindly opposed the tendency of the State to interfere in industry and attempt to lay down humane conditions for carrying on business of which the owners imagined that they alone possessed the right of control. The function of government was limited even by such men as John Bright and Herbert Spencer—and when the interests of the country were at stake, too—to what was called "keeping the ring clear" during the disputes between capital and labour.

Nevertheless, the more the instinct of ownership can be satisfied within reasonable bounds, the less we shall see such widespread disregard for public property as was common during the war, and the less will the pathological forms of the instinct prevail, as, for example, at

one extreme in the positive shape of miserliness, or at the other extreme in the negative shape of sabotage and violent destructiveness of property. It is at times when one feels insecure in one's attachments to life and when there is nothing of one's "own" to cling to for support in emergency that these excesses tend most frequently to appear. Consequently it is generally true that as the workman grows more prosperous in the material sense the more conservative and law-abiding and less class-conscious he becomes, simply because the more secure he feels and the more he will stand to lose by disorder and revolution.

The movement towards the control of each industry by the workers engaged in it is the most mature expression of this primal tendency (though other instinctive tendencies operate here as well), and it is, therefore, natural that the gospel of syndicalism, which marks one particular advance in this direction, should have originated in France, where the system of "small ownership" is so deeply rooted, and where few families are without a fund of savings to fall back upon in a rainy day. In many British industries something of this desire on the part of the workers for an interest in the control of the business or industry in which they are employed is satisfied to a certain extent by the co-partnership movement. (Strangely enough, the first co-partnership scheme was put into operation in the French workshops of the Parisian painter Le Claire.) The latest of these co-partnership schemes to appear is that of a big London business man, who till recently held all the ordinary shares in the store bearing his name. He has recently declared his intention to release 100,000 of these shares for the benefit of his employees, and to pay 2 per cent. more interest on them than he himself receives. It has been observed, too, that many of the Lancashire mill operatives are at present buying shares in the mills where they are employed. Ownership, however, involves control of what is owned, and about this point we shall

see some interesting conflict in the near future. But here, at the moment, we are not concerned to estimate the value of co-partnership : we simply note the phenomenon.

Closely allied to the instinct of ownership and the impulse of rivalry is the instinct of self-assertion or self-display, for we may best assert or display our individuality in a world predominantly commercial through what we own or have won. The labourer's gramophone, the miner's piano, the munitioneer's fur coat, the bank-clerk's motor-cycle, and the manufacturer's Rolls-Royce, are not, then, if our point is a good one, the exhibitions of senseless extravagance so much as the outward and visible signs of an inward feeling of *worth* and *status*. Few workmen are backward in taking the opportunity of being photographed in the presence of a big machine or something else in which they can legitimately be allowed to have pride. But the instinct of self-display may function in more ways than these, as will be seen, yet our youth is commonly spent in splendid dreaming of what we intend to achieve, and life gives little opportunity to us to-day to prove our worth, till we are so old that the sparkle and force of originality which we once possessed have left us. One cannot, therefore, but welcome the general movement towards shortening the hours of compulsory toil, and look forward to an era of adult education which will help us to express whatever creative ability we possess.¹

¹ Yet closely connected with the instinct of self-assertion in many people is the tendency to self-consciousness. The following passage from a daily paper will serve to emphasize this : " The psychologist may note that the correspondence course ministers in a very tactful way to the amazing self-consciousness of the Englishman about the things of the intellect. Everybody may know to boredom that he watches other men play football or plays golf himself, but the fact that he is attempting to get the maximum efficiency out of his brain or to deepen his culture must belong to the dark secrets of his life. Thus the constant instruction impressed upon these schools to send the lessons under cover of a plain envelope."

A few years ago Mr. Hilaire Belloc wrote a book¹ to show that we are in danger as a nation of drifting into the shallows of the Servile State where but a few think, while the many sheepishly and contentedly obey. He would no doubt have instanced Taylorism, had it been more widely known at the time, as an ominous portent of what was coming. To take from men the opportunity for exercising initiative and judgment on the score that such exercise hinders speedy production, without providing alternative methods of self-expression along the same lines, is an affront to the instinctive nature of man. All the reasoning in the world will not convince him that it is better for us all that we should ever give up the right to private judgment. It is a well-known fact that the seemingly servile member of a conquered race which still retains a large share of native intelligence, while he may be an obsequious and knee-crooking knave in the presence of his master, must be carefully watched lest the repressed affronted self burst its bonds violently at an unexpected moment. It is highly probable that many, but not all, of our criminals are men whose individuality has been repressed in such a way as to arouse the most violent of emotions by reaction.²

Nevertheless, in spite of what has already been said, it is an equally natural tendency to show submissiveness

¹ *The Servile State*.

² In an interview, Sir Evelyn Ruggles-Brise, Chairman of the British Prison Commissioners and Director of Convict Prisons, and founder of the Borstal System, gave a striking instance of this fact. A man who had received three sentences of penal servitude, and whose character showed him to be a person of most violent character, and strongly embittered against Society, enlisted on his release in 1916. After being severely wounded, and during his period of convalescence, he volunteered to save another man's life by giving his blood for transfusion. After recovery, he obtained a first-class certificate as bombing instructor, and returned to the front, gaining the Military Medal as well as the Distinguished Conduct Medal. Of him his officer wrote: "He is one of our best N.C.O.'s, and has rendered splendid service throughout, and that after three months in the hottest part of the line."

on appropriate occasions. "To submit under right conditions," someone has said, "is not only psychically pleasant, but much of the time to be leaderless is definitely distressing." Here is a tendency which is closely allied to the herd-instinct, the only significant difference being that in place of the protection of numbers the submissive individual prefers the guardianship of a strong leader. From babyhood to old age we have our leaders, men who represent in the flesh the supreme powers and ideals which we worship much as the lower form boy worships the captain of his school. The child who listens to tales of fairy princes and princesses, who according to legend actually do the things which he himself would like to do but cannot, and the boy who drinks avidly of the strong waters of romance as a substitute for living it, become the men who often feel small and feeble in the face of the masters of modern industry, and in place of personal self-assertion which would be painful, take their pleasure in submission to the will of a labour-leader who dares to do the things which they are too weak to do. The wicked agitator of the sentimental press does not need to corrupt men before they will listen to him. We are all ready to worship a hero, and whether he is worthy of worship is a matter of secondary consideration. The labour leader satisfies the tendency to submission in some respects only, however, for man is a many-sided being. Consequently, in an age when there is always something novel to admire, but few chances of excelling in more than one field, his hero-worshipping tendency finds changing satisfactions. One day the insatiable thirst of a people for a hero is satisfied by Hawker in his Atlantic flight, immediately afterwards by *Panther* in winning the Derby, then by Alcock and Grieve in their Atlantic victory, then by Mr. Smillie or the Geddes brothers, next by Lady Astor or by Sir Ross Smith, then in succession by Sir Thomas Lawrence, Carpentier, and Lady Bonham Carter, while at this moment¹ Mr. J. B. Hobbs is becoming the god of the hour. Mr. Tead² instances the fact that

¹ July 1920.

² *Op. cit.*, p. 118.

the manager or employer himself may completely oust the labour leader on occasions and become heroic in the eyes of his workers.

One large departmental store in a large Eastern city (he says) is in charge of a man who is really admired by his employees. To this manager who wants to run his store on genuinely democratic lines the subservience of the workers is a constant source of irritation. He stands up in meetings of the store employees and berates them roundly for their lack of initiative and aggressiveness. The spectacle of this gentleman belabouring the workers about their reluctance to assume leadership and responsibility is one to make the student of industrial democracy ponder and inquire more deeply into the psychological springs of action.

Such a student will probably discover what appeared in our discussion of monotony : that initiative and resourcefulness will disappear almost entirely unless deliberately cultivated from the moment of the worker's entry into industry.

Though this tendency to submissiveness is natural and even pleasureable when normally indulged, it is a great mistake to attempt to fix it as a permanent mood. In its spontaneous manifestations it is healthy : externally imposed upon any but the feeble-minded it breeds resentment by reaction. To be called in to see the manager and to have to remain standing uneasily and answer with a show of respect the questions of one who is perhaps magnificently at ease in a comfortable chair will make a worker feel small, but it may also arouse in him dangerous emotions. To treat employees with respect, on the other hand, is to stir into life the loyalty latent in the depths of every individual, and to gain respect in return. It would be a boon if one of our enlightened modern business heads would write an essay on the greater efficiency which comes through tactful and considerate treatment of individual employees. Recently in a conversation the chief of a big business house in London told us that when trouble occurred with any of his "assistants" (a better sounding word than employees) he called them in to see

him privately. He first of all put them at ease, and then endeavoured in a quiet, tactful way to get them to see that every such trouble as theirs could be traced to a perfectly natural cause, which together they might agree to seek and with mutual sympathy understand and perhaps eradicate. His friendly attitude invariably won the confidence of the assistants, and by positive suggestions made in the spirit of helpful friendship he was enabled to pour oil on the troubled waters to the good of all concerned.

Even considered on the lowest plane, as a mere business proposition, such an attitude anticipates many dismissals, and so saves to management much of the present large cost of the labour turnover which is so tremendous and so wasteful in most industries.

To complete this chapter a few more instances will suffice. It should be said that the Taylor system of functional foremanship removes to some extent the necessity for subservience to the will of a single foreman whom, perhaps, one cannot respect. It is the reaction brought about by enforced subservience, too, which is partly responsible for our dislike of forms of application for employment which necessitate our giving full details, as though to a superior, of what we would prefer to forget. Workers should be given opportunities of wiping out unfortunate accidents in their past; and this done, all official records should be destroyed. Severe treatment, too, of labour leaders, even when deserved, is unwise; for, as the old saying holds, "the blood of the martyrs is the seed of the church." An elaborate system of regulations and fines which workers have had no voice in deciding has also a marked irritating effect.

Speaking of the reactions of the worker whom submissiveness has exploited too far, Professor Carleton Parker, an American economist, writes:¹

The baulked labourer here follows one of . . . two . . . lines of conduct: (1) he either weakens, becomes inefficient, drifts

¹ *American Economical Review Supplement*, September, 1918.

away, or (2) he indulges in a true type, inferiority compensation, and in order to dignify himself, to eliminate for himself his inferiority in his own eyes, he strikes or brings on a strike; he commits violence or he stays on the job and injures machinery or mutilates the materials. . . . His condition is one of mental stress and unfocussed psychic unrest, and could in all accuracy be called a definite industrial psychosis. He is neither wilful nor responsible, he is suffering from a stereotyped mental disease.

A writer in the *World's Work* (July 1920) even goes so far as to describe a particular trade union as being largely recruited from this type of labourer. We quote the following passages for what they are worth as emphasizing the folly of expecting rational action from embittered workmen:—

Take the Independent Workers of the World in the United States. That organization is supposed to advocate Syndicalism, but only a very small proportion of the membership sees in it other than an organization of revenge. It has had a conspicuous success only among the Western agricultural labourers, lumber-jacks, and miners—in all of which fields the worker has been migratory and has been in the past shamefully ill-treated. Its membership consists of a mass of keenly dissatisfied men anxious to get even. . . .

They want to destroy. The "sabcat" who drives spikes into a farmer's field in order to wreck the machinery is thinking, as a rule, of some farmer who has misused him. The migratory worker is a man who has failed, or who, because he has committed some crime, must keep moving. He has no residence and no vote, and can easily be convinced that Capital and not his own shiftlessness has deprived him of a more regular livelihood. . . .

There is a somewhat similar class with which England is familiar—the hop-pickers. In every hop-growing region the picking season is one during which the farmers find it advisable to sit up nights watching their property and all the constables take on special deputies. The crowds that come flocking in contain an extraordinary proportion of criminals and rowdies. It would need small persuasive power to organize these bands for a mass depredation—unless individual depredation seems more profitable.

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§ 5. THE WOMAN WORKER

Among those who support the woman's "movement" towards economic equality with men there has been a tendency to make light of the natural mental differences between the sexes; indeed, in many quarters, to argue as a means to the end in view for their non-existence. If our aptitudes and abilities could be wholly dissociated from our deeply-rooted interests this view of the native equality of men and women at all points might be sound, but the fact that the upholders of the view themselves declare frequently that the entry of women into the spheres of politics and industry has resulted, owing to their peculiar capacities, in a marked increase in efficiency and in a better spirit and outlook is testimony itself to the belief that the vocational aptitudes of the sexes are probably complementary rather than in every respect the same. As long as women's economic activities were restricted by convention and custom to the province in which their sex-attraction had greater market value than their intelligence, the demand for a fuller and richer experience was to be pressed at wellnigh all costs. But whether whole-time participation in modern large-scale industry as routine workers¹—and it is in this connection that they are most sought after—is on the whole good for women is doubtful. To most students of human nature it seems that woman will only find permanent satisfaction in careers where her natural solicitude for life in its various forms and her skill in fostering its growth

¹ "A woman is ideal for repetition work."—*War Office Mem. on Work of Women*, August, 1916.

can find scope for expression: in careers such as teaching, nursing and healing, gardening, house-planning, and welfare work, in the administration of the law respecting these things, in the work of inspiration, through art, drama, literature and music, and in such occupations as are subsidiary to these main lines of activity. Women cannot and should not be debarred, however, from experimenting in whatever fields of work may attract them; in the words of Olive Schreiner they must for the present be allowed to take "all labour for their province."

Yet woman stands in more intimate relationship to the coming generation than the male worker, and the community is bound to regard her as a potential mother as well as a wage-earner. Many observers consequently feel strongly that it is bad for the race that women should enter the factories to take up repetition work and tend machines continuously for long periods. It is maintained that there is solid ground for the fear that the woman who becomes too completely adapted to the machine-work of the factory which offers no scope for ambition and few chances for promotion, to the life of crowds and noises and ceaseless movement, with little responsibility and a plain straightforward task calling for no great measure of thought, will fail subsequently in the home where, if children are present, vigilance, initiative and common sense are continually in demand. For such reasons welfare work in the factory must be encouraged, even if for no others. The "absentee" mother who does contrive, nevertheless, to run a home smoothly in her so-called leisure is subjected to too great a strain and grows old before she ought.

We ought not to forget, however, that one of the strongest motives urging the modern woman possessing spirit and initiative to enter industry is her dissatisfaction with the conditions under which she must manage her home to-day. As a writer whom we are unable to trace puts the matter:—

In the Middle Ages the wife had to grind the corn and bake the bread, tend the dairy and doctor her household, spin her wool

and weave her cloth, and prepare all her food-stuffs from the beginning. But time has taken from her this life of varied and interesting toil. It is the industrial revolution, not the higher education of girls, that has wrecked the home. The wife has left to her nothing but the care of her usually small family. If she be a rich woman, she is in the position of the manager of an over-staffed hotel beset with frittering duties that break her power of concentration, but which do not exhaust her energies: these overflow into the sterile creations of fashion and luxury. If she be a poor woman, she is an amateur at war with circumstance: her chief duties consist of keeping her children clean in a dirty house with an inadequate water-supply, and to nourish them on cheap and adulterated food cooked on an ill-designed kitchen-range that eats up expensive fuel.

Though much of the antipathy manifested by many men in trade unions against women workers is aroused through the placid contentment of the latter to do low-priced repetition work without regard for social consequences, "to undercut man's standards" as it is put, yet a considerable amount of sex-prejudice is undoubtedly fostered, unconsciously if not deliberately, as a method of creating greater trade union solidarity among men. But employers do not always avoid stirring up this prejudice. It is not tactful, to say the least, to announce as one employer did, "I am confident that a furniture factory could be successfully conducted with about 5 per cent. skilled men and 95 per cent. of women."¹ Men and women are at different levels of industrial development, and with the development of greater experience it is probable that women themselves will change in their attitude towards routine factory work. Miss Proud has pointed out the great disadvantages under which girls labour at present.² In the majority of cases, she says, a factory girl's life-work is undecided for at least ten years. She is uncertain whether she ought to equip herself for home-life or for industry, and after ten years of drifting it is not likely that she will be perfectly prepared for either.

¹ *Evening News*, London, October 20, 1919.

² *Welfare Work*, pp. 80-81.

Women are inferiors in the industrial world because they have not decided (except individually) that they desire to be otherwise. But there is little doubt that the future will witness the harmonious integration of the industrial aims and ideals of men and women.

The deep unconscious *élan*, then, which has created the demand for political and economic equality as a means to a richer and completer life, cannot be repressed. Time and patient study alone will enable us to see all the multifarious interests of men and women in proper perspective and without the interposition of the coloured and distorting screen of sex-prejudice.

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CHAPTER VII

THE CREATIVE IMPULSE IN INDUSTRY

§ 1. THE DECLINE OF THE TRADITIONAL TYPES OF CRAFTSMANSHIP

WE have already noted the fact that the root of the opposition of the craft unions to scientific management fastens about the tendency which it has undoubtedly accelerated towards the extreme specialization of function in industry. Ever since Adam Smith discoursed so lucidly from the point of view of output on the advantages of the division of labour, economists have never tired of advocating an increasing application of this principle. In following up our study of the instinctive attitude of the workers and employers we shall be compelled to take this opposition of the craftsmen into account, and to form some conception of practical utility concerning the general relations between modern industry and human progress and of the direction of the broad drift of contemporary life and endeavour.

The craftsman's incentive to industry is largely an interest in his work ; his aim is not only to gain a livelihood, but also to express his abilities and aspirations as fully as he can through the labour of his hand. So far the main appeal of the modern works manager has been on the whole not so much to an interest in making things well as to the general desire for material security and well-being. Nothing pleases the manager of a factory less to-day than to get orders for a *big number* of articles each of a different pattern ; nothing delights the crafts-

man more than to exhaust all his ingenuity and energy in the production of *single masterpieces* of skill. But the manifold material and mental needs of humanity in our time can no longer be completely supplied by the craftsmen, so that we are driven to the use of the cheaper standard article whether we like it or not. A civilization based on the old-fashioned craft system would be simpler, but even if we could establish it most of us would have to do without the many necessities and luxuries which machinery alone can provide in sufficient quantities for all.

Yet the craftsman may be partly justified in viewing with genuine alarm the gradual disintegration one by one of the old-fashioned crafts. The carpenter, for example, finds himself no longer what he once was, an engineer in wood with a thorough knowledge of stresses and strains and the strength of materials; he has been practically ousted from most of the up-to-date workshops where machinery has been installed, and the joiner who has displaced him spends his days like the factory operative in more or less mechanical repetition work. Even the cabinet-maker, who may perhaps represent in the popular imagination the skilled worker with a definite craft calling for the display of intelligence, invention, and artistic sense, is in reality either a standard deal dressing-table-maker or a standard oak dressing-table-maker, not both, and rises from expertness in such work not to a more general experience and more varied excellence of achievement, but to further equally specialized work on more costly materials or articles, such as, let us say, standard mahogany sideboards. This limitation and stereotyping of function is, however, not in itself so ominous a phenomenon as the consequent limitation of technical knowledge, experience and general skill among workers which it necessarily involves.

It was the aim of American scientific management in large-scale industry, as we saw, to transfer to management the body of knowledge and skill which the craftsmen

held as a monopoly, and centre it in the planning department where it could be analysed, standardized and mechanized and then handed back in separate part-processes to semi-skilled workers, none of whom would or could be familiar any longer with the work as a whole. We are not here concerned primarily with the question whether the machine-made article which results from the employment of such methods is or is not better than the product of the old-time craftsman's work : our interest is in the comparative effects of the new and the old systems of production upon the minds of the workers. Does the doom of the traditional type of craftsmanship necessarily mean the gradual disappearance of interest in work and of *all* craftsmanship, and the focussing of living attention, or what is left of it, somewhere outside one's full-time occupation ? Or, if practically the whole of one's conscious life must be devoted to work, can modern industrial occupations satisfy man's many-sided nature ?

The craftsman holds that the new system involves both the removal of interest from work and the thwarting of a fundamental impulse which it is essential for us to encourage if we wish to remain in the van of civilization. This impulse we have inherited from our animal ancestors ; it is the channel by which we find supreme satisfaction in our reactions to environmental stimuli ; it is the constructive instinct, the energizing reaction about which knowledge and skill most naturally gather and grow. The man who does not feel that he is making or helping to make something cannot be relied upon to put forth any effort which is distinctively human effort. Yet the instinct is not peculiar to man. We see the constructive instinct followed in the nest-building activities of birds, in the dam-building of beavers, in the web-making of spiders, and in the honey-combing of bees. But here man differs in a marked manner from the animals from whom he has inherited this peculiarly pleasing method of reaction : the animals rarely if ever improve upon the hereditary pattern of their constructions, whereas man

is distinguished by an ever-increasing variety in the methods and in the results of his creative work. Thus the beaver constructs one type of home, the thrush one type of nest, but the houses of man are infinite in their diversity. So with all that he does : his restless invention is ever appearing in new forms of surprising originality.

Though we are mindful of the fact that many men of supreme intellect, notably Newton and Kant, have been weak in body, yet it is generally true that poor physique and mental drowsiness on the one hand, and virility of body and alertness of mind on the other, go together. Indeed, the strength of the constructive instinct—we are not here speaking of its quality—seems to vary directly with the mental and physical vigour of men and women ; that is to say, the greater the amount of muscular and nervous energy in normal people, the greater the tendency towards some form of constructive activity. Hence the importance of a high minimum standard of physical health and mental comfort in any community if we wish to increase our efficiency and inventiveness. We have spoken of the fact that repetition work has a peculiar attraction for the feeble-minded low-grade worker only. The report by the National Service Medical Boards on the physical examination of men of military age during the recent war shows conclusively that factory life and defective physique are closely associated ; that while the “ indices of fitness ” in industries like mining (an occupation which demands both intelligence and strength) and agriculture are 90·5 and 89·9 per cent. respectively, in tailoring and the cotton trade they are only 62·3 and 72·9 per cent., so that in Lancashire and Cheshire, “ the average man here is, for military purposes, an old man before he reaches the age of forty.”¹ Some investigators have given the average age of the factory worker as little above thirty. Statistics are urgently needed to show us exactly what happens to the average factory

¹ *Physical Examination of Men by National Service Boards.*
See also footnote, p. 126.

worker after the age of forty. If the effect of factory life with its unvaried monotony is bad physically as we suspect, equally pernicious must its mental effects be, and it is the mental factor and the mental influence of repetition work with which we are primarily concerned.

Now, the phenomenon of repetition work deliberately self-chosen, that form of activity which is not usually associated with a high-grade virility of intellect, is not the mark of the under-nourished routine factory worker solely ; it is to be seen in the artistic world as well as in the factory, but its influence there is equally deadening. The minor novelist, the musician or the painter who succeeds early in his career in winning popular approval, too often aims thereafter at nothing more ingenious than a repetition of his old effects, while the supremely great artist passes on from the triumph of every achievement to fresh fields of enterprise, challenging new difficulties for the sake of the joy which he experiences in overcoming them. Just, then, as we have the metal worker specializing for years in turning bolts, so we have the type of artist who never strays beyond his own chosen corner of the world of art. It may be said, of course, that the artist who is under no obligation to attend to one particular aspect of life and experience continuously would do better if he cultivated a many-sided interest in the world about him, but the reply will usually be given that in no other way than by rigid specialization can success be achieved, that modern psychology has amply demonstrated the impossibility of becoming expert in one thing if one's energies are being scattered over others, that you cannot become a playwright by painting portraits, or an actor by violin practice ; in short, that a Jack-of-all-trades is generally a master of none. Moreover, we shall be told that one's whole personality is fully developed in any branch of art, but this obviously depends on the personality. It certainly seems as if the days of all-round culture have passed for the majority of men.

In so far as he has a definite ideal of what any single

workman ought to be, the scientific management expert of the Taylor school would probably say, and as Gilbreth indirectly says, that we must aim at the supply and development of workmen who will find as much interest in making wheelbarrow handles, let us say, as Barrie finds in writing sentimental comedies, or as W. W. Jacobs in writing tales of Thames-side. Does this point to a desirable or realizable ideal? We may suspect that even such men as Barrie and Jacobs occasionally tire of the monotony of their themes and methods and the sameness of their cultivated mannerisms. So we may justifiably doubt the possibility of any one, if we except the feeble-minded, possessing a permanent interest in such highly specialized routine work as bottling vinegar or wrapping up electric lamps.¹ Something more must be done to ensure the continued vitality of the spirit of invention, or the race is doomed. Specialization is good only if it is illuminated by a wide culture: we see the spirit of invention alert when it is able to turn its attention away frequently from its specialized objective and rove over the whole wide field of human interests. It was not a narrow-minded specialist in blinkers who first saw that if the principles of the nail and the gimlet were combined we should get the modern screw. As an example of the restricted vision of an over-divorced specialization we have the illuminating example of the case of the belated discovery of the printing process, the possibility of which depended on the invention of movable type. Yet thousands of years ago the principle of the movable type was in existence in the instruments employed for affixing the king's seal to proclamations, but the scholars whose interests did not extend to the world of affairs continued to write out their books laboriously by hand,

¹ Miss Proud (*Welfare Work*, p. 88) speaks of a girl who worked excellently in a factory till she had learnt all she could about her machine, and lost all interest in her work as soon as this was accomplished. She became then a commonplace and dissatisfied worker, a source of trouble to those in authority over her.

unmindful of the unheeded hint that was daily before their eyes.

It would seem that the constructive instinct which calls clearly for careful consideration, since it is so important a factor in determining the highest quality of human motivation, is closely connected with and probably originates as a specific differentiation of the play-impulse manifested when we possess an abundance of physical and mental energy over and above what is needed for the requirements of life. It is because this connection is so intimate psychologically that a permanent divorce between work and play is fundamentally artificial and injurious. Work which is genuinely constructive will always occupy the play energy of all normal people engaged in it, while every one knows that we put the equivalent of a marked amount of real hard labour into our favourite games. Those who play little, either mentally or physically, never achieve greatness. The play of the feeble-minded and the feeble-bodied of the slums, such as it is, is almost wholly imitative, and often merely reminiscent, when it is at all vigorous, of the games of primitive people. The desire to experiment with life for the sake of discovering new adjustments—and this we said is the mark of the best intelligence—is rarely active among the slum-dwellers because new adjustments involve a degree of *willed* attention which such individuals can never give.

Thus, in our inquiry into the general problems of motivation in work we have the mentality of two different classes of worker to take into consideration. There is no universal desire for an increase of craftsmanship. There are those who rebel against the working conditions of the great business or factory, because these thwart in so many cases their efforts at self-expression, it is true, but we also have those who have become completely adapted to modern industry, who find routine work a rest, who like tasks to be so monotonous that they can perform them asleep, and who resent efforts to educate them into alertness. Investigators who argue that

factory work is not mentally depressing quote freely in illustration of their contention the experience of the latter type of worker. Those who see in modern industry nothing but evil quote the example of the hooligan and the statistics of crime and lunacy. (There is no doubt that with the passing of the old type of apprenticeship, juvenile labour is being in many cases over-exploited and hooliganism and crime are but a natural reaction, so that the time is ripe for an attempt to revive the conception of apprenticeship in a form suitable to modern needs.)

It is this variation in the amount of available mental energy among us which is responsible for our varying industrial ideals. The craftsman's ideal of life is the life of creative activity; but the factory worker who finds little interest but considerable nervous strain in his enforced labour tends to idealize the life of leisure with its freedom from responsibility. To prosper by worthy achievements is the aim of the man who has found his life work: to get rich by luck is the object of those whose work is their prison. Out of these two entirely different attitudes spring two radically divergent philosophies of industry, which, if civilization is to retain its equilibrium, we shall be forced somehow to synthesize. William Morris and John Ruskin of the nineteenth century represented one attitude: the masses of our large cities who find their chief enjoyment in the passive pleasures of the cinema and the football match represent the other. Now, the united functioning in a single occupation of the work and play impulses should be the objective of every industrial reformer, and whatever facilitates its achievement must be supported and whatever hinders it removed.

When Dean Inge, however, told us that the human race had been for thousands of years a race of tillers of the soil, of hunters and of fighters, that these were the occupations for which our organisms were adapted, and that we were not acclimatized to any others, he was showing us the seamy side only of the Brussels carpet of

life. There is another side. Human nature is not rigidly constructed but capable of extremely wide powers of adaptation to changing circumstances; we have seen how that even in the feeblest of our species those unfortunate persons who have been reared in physical and psychical privation, shut off from the stimulating effects of good food and fine art, literature, and music frequently adapt themselves to the worst features of industry. But if such persons can adapt themselves to industry at all under modern conditions, surely those with greater vitality can effect a better adaptation by a modification of their work, rather than of themselves. When Dean Inge, therefore, following Ruskin, speculates whether it might not be wise after all to plan a retreat to the easier conditions of a more primitive time gone by, when in a simpler industrial commonwealth men could work out their salvation at greater leisure and with fuller assurance of success, we must decline to follow him. We should be obliged to give up many of the advantages which are the direct outcome of an intolerance of the *evils* of simpler times. It is by no means certain that the present tendencies are wholly evil, and the general opinion is to be preferred that we are living in a difficult age of transition which will soon pass, and that with common courage and sagacity we shall yet plant firmly the foundations of the future. Besides, if we cannot, as many think, adapt ourselves to the relatively familiar conditions of to-day, how could we be certain of adapting our civilization to the stranger conditions of an age long past?

§ 2. MODERN RECREATION

If the quality of the constructive instinct is closely connected with and dependent upon that of the play impulse, as we have suggested, then the amusements of a community should shed considerable light on the problem of framing a just estimate of its general mental vitality. It may be profitable, therefore, to reapproach our subject through a consideration of the recreative activities of our people. In the palmy days of Athens, Florence and Elizabethan England, when the spirit of civic or national enterprise and adventure was at its height, there was also a great outburst and manifestation of the popular expression of the play-impulse through the loftiest kinds of art. Such art reflected the general sanity and vigour of the people. Now, when the majority of any community is to be observed spending their leisure in organized exercise of body and spirit we shall always be justified in concluding that their *morale* is sound and that their industry and commerce are both a stimulus and a satisfaction, while the general prevalence at any time of such amusements as are provided by cock-fighting and bull-fighting indicates, we may be tolerably sure, a lack of disciplined intelligence and of sympathy.

It will hardly be denied that an outstanding feature of the more popular forms of modern recreation is their call for the merest minimum of organized mental and physical activity on the part of their participants. In illustration we might draw attention to the comparative docility of the football crowd and the cinema audience, or instance the spread of the gramophone, all of which

provide merely a vicarious exercise of the play-impulse. The weekly half-holiday which supplies to hundreds the opportunity to indulge in sports and games sees thousands flock to a single football match. Even a mid-week first-class game will draw to-day as many as thirty to forty thousand artisans from their work in spite of appeals and threats of dismissal. In addition, another fifty to one hundred thousand will patiently await the appearance of the evening newspaper to get at second hand a feeble experience of the thrills of the game. The significant aspect of all these pastimes is that 90 per cent. of the able-bodied persons who look on at the athletes, or read about their prowess, take part in no active games or recreations themselves.

In the case of the cinema, which is rapidly ousting from popularity all competing forms of indoor amusement in our factory towns, we see the appearance of a type of entertainment which, as no other can, provides a soft mantle of repose for the overstrained and weary worker who is enabled to sit quietly and cheaply in security and in semi-obscurity and be lulled into forgetfulness of the monotony of his existence. Presented with a story which makes but few demands upon his reason, memory or judgment, for it is much easier for a tired spectator to follow the pictures than the legitimate drama, he is invited instead to a banquet of good things and stimulated into taking an interest in them. To a man or woman who has been working at high pressure on tasks involving severe concentration of mind the cinema show is often a pleasant relaxation. To the routine worker who has no occasion or ability for heavy mental work, whose days are spent in repetition labour involving neither responsibility nor judgment to any marked extent, "the pictures" provide not only a sedative, but also a certain amount of spiritual nourishment in a form sufficiently strong for him to digest satisfactorily.

The cinema really represents the spread of "scientific management" into the world of art. Like Taylor, the

super-producer in the world of art sees that there is a demand for light amusement which the small, badly-organized and comparatively inefficient travelling companies cannot supply: he has, therefore, introduced a labour-saving method whereby a few well-paid and uniquely efficient workers, active in body, brain and mind, can do with the aid of machinery what thousands of less efficient actors and actresses were doing poorly; which, moreover, can supply millions of persons with amusement while they were only supplying it to hundreds. It is too early to vote the experiment a success from all points of view. One may wonder, for example, what the effect of the cinema will in the long run be on the growing mind of the normal child, and whether he will eventually tire of it and demand something more exacting, or not.

The gramophone plays much the same part: it provides with the minimum discomfort, or rather bodily inconvenience to the listeners, the kind of music they want to hear; moreover, it becomes accepted as a permanent substitute, in many cases, for artistic self-expression. In art, then, as well as in politics, where the phenomenon has long been remarked, the people call for a leader or substitute to say in their stead what they dimly feel or would like to feel but cannot hope to utter in an authentic manner.

When the more popular forms of amusement do involve a marked degree of activity in their participants, they frequently take the form of violent reactions; primarily they seem to be pathological protests against the drab monotony of existence. Even the spending of leisure is an art which has to be learnt, and many have not the intelligence for learning it. In such reactions there appear to be few signs of organization or forethought; they are little more than the cry from the bruised heart. As typical of this kind of amusement the following incident may be quoted. At the news of the armistice in November 1918 some Air Force officers in France poured petrol over their piano, which they had managed to purchase

after considerable difficulty for their mess, and set light to it. Then they danced round it in reckless abandonment for several hours, wildly singing songs of the most ridiculous character. We can understand and when necessary condone such an action if we view it as merely expressive of a sudden relief from tension. What we do not so easily understand or forgive are the bank holiday revels of the crowds on Hampstead Heath or the antics of those who welcome the New Year with cat-calls and mafficking on the steps of St. Paul's.

As a form of protest-behaviour directed against the monotony of existence, as some find it, we might, of course, instance the habit of gambling, which is so prevalent among those lacking in healthy interests. Either because they are without an occupation which has the power to discipline them or because their occupations discipline them too much, their free energy finds in the habit of gambling a suitable attachment. It is not merely the wish to get something for nothing which animates them, but the desire also to render the tedious passage of time more tolerable by having something to look forward to and think about. Another form of protest behaviour is seen in frequent drunkenness. The prohibition of the liquor traffic in so far as it affects the drunkard is often a method of suppressing the *symptoms* of psychic unrest; and consequently it is natural that we should find the statistics for crime in "dry" districts increased immediately after prohibition sets in, as they apparently do. The habit of drinking alcohol is not the outcome of simple depravity, any more than that dance round the burning piano was. Hundreds of thousands of men in the fighting forces learnt to drink intoxicants for the first time during the war, because they discovered that the practice brought with it a heightened sense of vitality and confidence when the world was blackest around them. Alcoholism to-day in all countries in the same way frequently originates as a defence-mechanism against something which is intolerable, so that to remove

the means of getting relief from anxiety without attacking that which causes it is neither sound psychology nor wise statesmanship. It may be said with a fair measure of truth that nearly all our industrial troubles to-day are due to the disappearance of satisfactions to which men had become used, and the absence of new ones to substitute them.

It would seem, then, that the amusements of the great mass of the people do point to the existence of something wrong with things as they are. They, too, indicate the passing of the older forms of creative self-expression. As Dean Inge says, we are incompletely adapted for life under present conditions, and we must, if we are to rise above merely destructive criticism, analyse these conditions and suggest if possible how they may be ameliorated, so that man can satisfy his natural interests and emotions. Can we alter the worker's attitude to his work by attention to his play? Can we improve his powers of ready adaptation by providing better amusements which by their appeal to the constructive activities of men and women will make industry more endurable? Many firms, with praiseworthy motives, have organized for the workers both outdoor and indoor sports and recreations, dramatic and musical societies, horticultural and photographic clubs, literary circles and rambling parties. On this point Mr. Tead observes:¹ "Apart from stated recreational events of definite business value as advertising or as conducive to a better *esprit de corps*, of which an annual company outing is an example, it is, however, to be doubted, from the point of view of human nature, *whether play should normally attach itself to industry rather than to the civic or neighbourhood side of life*. There seem to be sound psychological reasons for believing that the relaxing, irresponsible and care-free atmosphere in which play thrives centres naturally about the older, more natural, more instinctive human groups—to wit, the family and the neighbourhood—rather than about such a completely

¹ *Op. cit.*, p. 175.

artificial thing as the modern factory in a large city. Where the factory exists as the one gathering place of a mill-town the situation is manifestly different, and recreation can function differently. But in the typical industrial city the social and recreative life normally falls into channels of home or lodge or neighbourhood, and little or nothing is to be gained by forcing the creation of an industrial recreative unit."

While such efforts to provide forms of healthy recreation closely in touch with the factory are admirable, it should not be forgotten that they involve an undesirable limitation of the worker's circle of experience. It is not good for us to move always in the same restricted social environment, whether "high" or "low." Those who have had the experience of living in both some of our cotton-mill towns where there is just one industry and practically nothing else to absorb the industrial energies of their inhabitants, and in neighbouring towns, too, where there happens to be a great variety of occupations, in factory work and engineering, in railway work and shipping, in mining and flour milling as well as in spinning and weaving in cotton and wool, have probably realized the importance of diversity of interest among people as a factor in stimulating intelligence. Variety in social intercourse is equally necessary; we must avoid stereotyping our mental contacts and so circumscribing unduly our mental outlook.

If, then, as we have suggested, our play is an index of our mental growth, then by adding to and improving the worker's opportunities for healthy recreation we shall make his leisure more profitable both mentally and physically, and his increased vitality will to some extent be spilled over into his work. But we cannot in this way substantially alter, when it is *embittered*, the worker's fundamental attitude towards his occupation. If work is divorced from play then an increased interest in play is not likely to produce any permanently increased interest in work.

We have, then, by some means or other to recapture the general interest which, according to the craftsmen, was once centred in the enterprise of production, to advance technology and restore to strength man's inventive powers, which are fast dwindling among all but those who are our outstanding intellectual leaders and industrial organizers. If, as we have repeatedly suggested in these pages, full efficiency depends not only on the improvement of workshop conditions and economical methods of labour (including the psychological selection of the workers for their tasks and the tasks for the workers), but also upon attempts to secure their spirited co-operation, then we shall be forced sooner or later to reorganize industry with a view to providing scope for their initiative and satisfaction for their ambitions. How can this be done? The development of definite ideals of procedure by the workers for the recovery of their lost initiative and independence indicates, we think, the road by which we shall be forced to proceed.

§ 3. IDEALS IN INDUSTRY

Though we have not yet discussed all the forms of instinctive activity to be observed in industry which may be regarded as simple and primary—for instance, there still remains that energizing spirit of intelligence, the instinct of curiosity, responsible in its more refined forms for the passion which prompts scientific research and the myriad other forms of educational activity—we may, perhaps, at this point profitably turn our attention to the manner in which we are able to convert our native endowment of crude impulse into the driving power of satisfactory social aims and ideals of a constructive nature. Personality finds us enduring pleasure in continually moving along the primitive trails and reacting in unmixed fear, in uncomplicated repulsion, in an assertiveness wholly self-regarding, or in pugnacity *sans phrase*; such reactions are serviceable enough, maybe, in times of extraordinary danger, but for meeting intelligently the ordinary demands of civilized life they are insufficiently discriminative, and so in the long run ineffective. Man, as compared with the animals, is distinguished by his ability to learn *readily* from experience; hence his tendency to suspend short-sighted emotional impulse in favour of a reasoned response, often delayed, which satisfies several simultaneously aroused impulses at once. Certain familiar objects (or persons) habitually call out definite complexes of elementary emotion. These complexes are embodied in “points of view”; thus the morality and the conventions of the social group are acquired in this way, and with the growth and organiza-

tion of our mental life sustained by feeling, but moulded into an approvable form by intelligence, there arise the rational forms of conduct in which the tendency to react blindly and unthinkingly is naturally controlled and the impulses which otherwise might conflict are run together harmoniously, as it were, in a team with a single objective. Thus, devotion to a person, or a principle, or a cause, will short-circuit all our pugnacity, constructiveness, curiosity, submissiveness, and so on, into a single channel of service. It is when an object, or person, or principle excites not a simple emotional response, but a complex of emotions that we speak of the latter as a sentiment. A sentiment in action is an interest, and a harmony of sentiments illuminated by reason is an ideal.

The constructive attitude towards industry, representing as it does the due subordination of unrefined self-interest and of the impulse to immediate reaction, so that purpose and passion and reason are effectively balanced in a forward moving tendency, naturally expresses itself through ideals. All the participants in industry who give thought to their position and their deeper feelings develop definite interests and ideals, but we cannot bring about the industrial renaissance which we hope for by devotion to an ideal which embodies one type of interest alone and ignores others, for interests which are ignored do not simply drop out of existence, they are much more likely in such circumstances to become flagrantly rebellious and, if deliberately thwarted, destructive in tendency. Can management, therefore, afford to ignore the constructive interests of labour? Or can labour yet safely neglect the adventurous purpose natural to management? We shall regress to the anarchism of elementary passion unless we can contrive a working synthesis of the constructive interests of all engaged in industry.

What is apparently needed, then, as a sound remedy for unrest is such a reorganization both of our industrial and educational systems as will allow—nay, stimulate—every employer and worker into seeking his

salvation, not blindly and crudely through the indulgence of his explosive primitive reactions which lead nowhere except into disaster, but in the intelligent pursuit of an aim of *common choice*. Till this consummation can be effected humanity will continue to live in a condition of mal-adaptation to the social environment, with the prospect facing it of an eventual relapse into barbarism.

Several suggestive proposals for the re-organization of industry, however, have been put forward by men of constructive purpose, and to a brief consideration of the *psychological aspects* of these proposals we must now pass.

§ 4. CO-PARTNERSHIP

The ideals of co-partnership and profit-sharing represent a praiseworthy attempt on the part of certain employers to create a deeper interest among the workers in the industry in which they are employed and so secure their full co-operation. Bearing in mind the manifold complexity of human nature, however, we shall not be surprised to find indisputable psychological defects in most of the co-partnership schemes which have been launched, admirable in intention as they are. They have in too many cases been conceived in the same spirit as Taylor's wage-system, that is to say, they have depended for their success mainly, in fact almost exclusively, upon the worker's desire for material gain.¹ Moreover, many of them aim at the destruction of labour solidarity.²

¹ The British Government, 1920, *Report on Profit Sharing and Labour Co-partnership* (Cmd. 554) contains a classification of the reasons for the failure of 177 schemes. As many as 91 failures are described as due to dissatisfaction on the part of either employees or employers. It is probable that many of the other failures could be accounted for in a similar manner, although the reasons given for them were ostensibly financial. (The causes in thirteen cases were unknown and equally probably psychological.)

The general conclusion of the report may be gathered from the following quotation (pp. 27-28): "On the whole, it must be concluded that if the employer looks to a scheme of profit-sharing to stimulate his workers to increased exertion *and to maintain the stimulus for a long period of years* he is not unlikely to be disappointed."

² "On the whole the attitude towards Trade Unions of employers who definitely undertake welfare work seems to be more conciliatory than that of employers who enter on profit-sharing or co-partnership schemes" (Proud, *Welfare Work*, p. 54).

They have offered a partnership which is not a partnership in the real sense of the word at all, a partnership not in the common responsibilities of formulating policies and making decisions, but in profits, and this to a limited extent only. Now, in co-partnership, as Lord Robert Cecil said in the second Earl Grey Memorial Lecture, "the broad principle that capital and labour must be treated on equal terms is the *essential thing*."

Even the co-operative movement, which was initiated with the force of the ideal of fraternalism to give it driving power, has largely become sterile as a regenerating agent in society, owing to the confinement of the appeal for public support to-day to the desire for material gain: benefits are dangled before the members more frequently than the idea of mutual aid is preached to them.¹ The workers will never be won over to the whole-hearted service in industry through co-partnership as long as the latter simply involves sharing the profits of business. Men will continue to regard all co-partnership schemes as attempts to bribe them into giving up their independence. That such an attitude is a wrong one is of small importance beside the fact that it is a potentially dynamic attitude. Consequently such schemes must be based on the cash payment plan to win any measure of acceptance. Yet this being so, they will always offer in the main rather the shadow than the genuine substance which will alone satisfy the baulked instinctive tendencies of the workers. Other additional motives must be enlisted in the support of schemes for the betterment of industry if they are to secure enduring support from an educated democracy.

The experience of the Thomson woollen firm at Huddersfield points the moral that you cannot breed loyalty and idealism by cash payment alone. The results of the Thomson venture in co-partnership are significant.

¹ This now needs modification in view of the financial support which is being rendered to the Building Guilds set up in various parts of the country.

The head of the firm took his workers into real partnership. He drew by arrangement a salary of £500 a year as manager, and nothing more from the business, and opened his books to inspection. The workers were won over by his complete sincerity: the way was opened to them for the full expression of their intelligence, and on one or two occasions when there were losses on the year's transactions they voluntarily made them up out of their own earnings. The amount which they contributed in this way, £1,400, was returned when the firm began to make profits in 1912.

In the light of the foregoing remarks the Manchester Building Guild Scheme is a most extraordinarily interesting experiment. The essence of the scheme as originally formulated is that houses are to be built at net cost, excluding *profit* (that is to say, cost of labour and materials), plus 10 per cent. This 10 per cent. would be utilized to meet management expenses, cover the purchase of plant, and fulfil obligations which the Guild would undertake towards its workmen (in sickness, unemployment, etc.). The constructive spirit which informs the scheme shows itself also in the revolt against bad workmanship and speculative jerry-building, which has been voiced by its promoters, so that if the enterprise is successful we may look to a revival of the spirit of co-operative craftsmanship in spite of the decay of the old-time crafts.

The principles, objects, and progress of the Building Guild, which at last has overcome all the obstacles in the way of its getting to work, are set forth in a voluminous report which has just been issued from the headquarters of the Guild in Manchester.

"The Guild," concludes the report, "declares that it has a definite duty to the community and to its fellow workers in other industries. This duty is best accomplished, not by abrogating the rights of self-government with what that properly involves, but by returning to the community all and any surplus over the cost of production. It is for this reason that it has steadily refused to build houses at a profit. In every case it has tendered on the basis of cost. Not commercial cost, which takes no account of wet time, or unemployment, or sickness, which is callously calculated merely upon the commodity valuation of labour at so

much per hour plus the cost of raw materials, but upon the social cost of labour, which includes these factors and vicissitudes. Beyond that, labour has no claim ; the Guild makes no claim. Even the plant is vested in trustees, who must see that it is used for public and not for selfish purposes.

"Finally, the Guild declares that true craftsmanship must be revived. There is no reason, save only the profiteering greed of modern capitalism, why building guildsmen should not equal or surpass the triumphs of the mediæval period. But to attain this the National Building Guild must control not only its mature, but its immature labour. All technical instruction and training must come under the Guild's jurisdiction.

"The Guild is the only alternative to the existing capitalist system. But it will fail unless, with self-government and wage abolition, it also revives the spirit of craftsmanship, which can only come in good fellowship and mutual aid." (Report, *Manchester Guardian*, August 16, 1920.)

The genuine kind of co-partnership which involves the right to be consulted about affairs of common interest peeps at us through the report of such experiments as indicated in the Thomson and the Building Guild experiments and in the following passage from the publication of an American firm :—

The manner in which the men are treated largely determines the success of the manager or foreman. Certain methods have been acquired from the environment, education, or training, and they are followed. They secure results, but not the best. Yet these managers know no other way. The Filene Co-operative Association of Boston is an instance of reversal of traditional business habits. The William Filene's Son's Company decided to give the men and women behind the counter of their department store a voice in shaping the policies of the store. The association, composed of members of the firm and of all employees, may initiate or amend any rule that affects the efficiency of employees. The decision passed by the council may be vetoed by the management, but if after such a veto the association passes it over the veto by a two-thirds vote, the decision of the association is final. The plan made a sudden break from traditional business methods, yet it succeeded. A single instance will show how admirably and reasonably the employees have responded.

The question of vote was whether the store should be closed all day Saturday, June 18th, the day preceding being *Bunker's*

Hill Day, a State holiday. If this were done it would give the employees a three-day holiday. . . . Agitation had been quite intense during the days preceding the meeting, for the employees were naturally interested in having the additional day's rest with pay; the meeting was to hear both sides of the case to decide. After those in favour of closing had made their plea, those opposed brought out an argument few had considered, the fact that the conditions were not analogous. It was pointed out that a Saturday in the middle of June was much more valuable and costly to lose than one in July, that it was the last of the Saturdays before the bulk of the school graduations, and that much more business would in all probability be lost. When the vote was taken the employees voted by an overwhelming majority not to have the extra holiday! . . .

Employers, then, who initiate co-partnership schemes must be prepared to move along the common road towards a real industrial democracy if they wish to make the venture a psychological success. The fact must not be overlooked that the opposition of the trade unions to co-partnership and bonus schemes cannot be overcome unless it is patently clear that the initiation of those schemes is *not* merely a tactical move on the part of employers to break up the solidarity of labour. In so far as such schemes lead men to work harder and with greater loyalty to their employers they are good; but it is a mistake to attempt to secure this result at the expense of loyalty to the interests of fellow workers. The attempt must also be made to show that profit-sharing is not merely the giving (with an eye to its advertisement value) of what has really been earned.

§ 5. STATE SOCIALISM

For a reason much the same as that which makes the general principle of co-partnership as we see it to-day in most of its forms only partially satisfactory as a solution to our industrial problems, the ideal of state socialism will prove equally illusory. Both plans neglect to take into consideration the existence of certain fundamental tendencies of human nature, the main point of difference being that whereas co-partnership depends for its success almost exclusively on self-interest and the desire for individual material gain, state socialism tends to exclude these motives from the grounds of its appeal. The advocates of the one aim too high, those of the other too low.¹ But we have already attempted to show that practically all our industrial trouble has arisen either from the deliberate thwarting or neglect of innate tendencies which we possess in forms powerful enough to survive with all their original strength the passage of centuries.

There is, however, in addition another psychological defect which state socialism will find it extremely difficult to eradicate from its constitution: it threatens to depersonalize our public services. All our relations with state departments notoriously become stiff and formal in time.

¹ From a weekly newspaper we take the following: Mr. Withers, the author of *The Case for Capitalism*, was once asked on a lecturing tour at the front why wage-earners should not be paid just as soldiers are paid. "Everybody knows," he answered, "how you soldiers work when you are fighting, but when you go out to do fatigue work——" A roar of laughter from the rest of the audience made the roof of the hut ring, and left nothing more for him to say.

Experience has shown that the bureaucrat invariably tends to work mechanically in accordance with the letter of the regulation and the law as a means of safeguarding himself, and cannot be relied upon to show any greater sympathy towards his subordinates or the public than the worst of employers. There is accordingly gathering a considerable wave of feeling which may swamp completely what enthusiasm has hitherto existed in favour of state socialism, of fear that it may involve, on the one hand, an excessive centralization of power, and on the other, local docility and ineptitude.

It is the *mechanism* of a perfect state which in its best known forms state socialism shows us. It is quite obvious that the parts are of excellent construction and fit admirably. The ingenuity of the whole contrivance moves us to astonishment, but it is not certain that human nature will ever make it *work*. It seems to work beautifully enough, it is true, in the Utopias of Bellamy and Blatchford and others. There, however, we see it in full running order. If state socialism to-day were found in running order, we, too, might be able to maintain the miracle, but our simple trouble, which it passes the wit of man at his present stage of evolution to overcome, is to discover how to set such a machine initially in motion. State socialism, that is to say, provides us with the mechanism of a perfect society, but we have not yet developed the spirit which will match it. Nevertheless, it is apparent to all that we need better social machinery than we have at present, the only practical point of advantage about the old discredited machine being that since we cannot build up a new one immediately to the taste of everybody, we can at least continue to remodel gradually what we have till we have thus built up out of the indispensable elements of the old and the best elements of the new something which may be better than either.

§ 6. SYNDICALISM

Syndicalism, another ideal which has secured much popular support and devotion, is also the expression of a restricted range of interests ; it is motivated too much by the human tendencies of the workers towards the ownership and self-assertion and too little by the equally human protective and constructive tendencies already operative. It appeals to organized labour because it promises to the workers full control of the industry in which they are engaged, but in the extreme forms in which it is usually expressed there undoubtedly lurks the possibility of its splitting the community into antagonistic sections, for conflicts between the workers in any one industry and the consumers of their product would be rendered inevitable. The movement towards Syndicalism, however, in these forms is a reaction phenomenon, and comes most into evidence during strikes and lock-outs. In its impulsive forms it shows itself blind to the necessity for securing the co-operation of the organizer and the administration in its effects. During such times speech often becomes intemperate and idealism incoherent in its expression. In calmer times and in happier circumstances we shall hear little of the violent aspects of it. Thus it was during a "strike wave" that Mr. J. H. Thomas gave utterance to the crudest type of Syndicalism at Leyton.¹ "The N.U.R.," he said, "would not be a party to giving cheap travelling facilities to the public at the expense of the sweated railwaymen." We quote these words to illustrate the tendency of the syndicalist spirit towards sectionalism.

¹ Report of speech at Leyton, February 8, 1920.

To emphasize under the influence of emotion a divergence of interests between any one class of workers and the rest of the community is distinctly unwise and harmful.

It is usually believed that it is the characteristic vice of the bureaucrat, and of him alone, to formulate plans and impose them on the public regardless of convenience. Thus the suddenly announced decision in August last to raise railway fares revealed a fundamental lack of psychological insight on the part of the Government, as was apparent from the immediate reaction of the irritated community. But the labour leader, too, needs to take more intimately into account the condition of the public mind when he is about to declare a move on behalf of his union. The lightning-strike, which is a popular weapon among those who have used it, may have great mechanical consequences, but it invariably alienates the suffering public. Always to consider the public well-being is without the least doubt the best industrial policy. Happily, many of the leaders of the workers are beginning to see that our interests all hang together, and that only solutions which benefit *all* will be effective in the long run.

§ 7. INDUSTRIAL DEMOCRACY

What ultimate form the organization of industry will assume we cannot tell, but the present tendency is towards the ideal of *constructive co-operation*. The demand of labour for a share in the responsible control of industry is the recognition of an *identity* of interest between employers and employed. To-day we have two vital movements towards a more harmonious and effective association of workers and management represented in Guild Socialism which combines the advantages of syndicalism and state socialism without their disadvantages¹ and the Whitley Councils, the latter providing the possibility of reform from within the present system, the former frankly more hostile to it. Both offer the workers opportunities for the satisfaction of something of their desire for a share in the control of industry and a scientific understanding of its problems. For what is lost through the disintegration of the old crafts both substitute the sense of co-operation in the vital activities of re-construction. The comparative values of the schemes is a matter for

¹ "A guild is a combination of all the labour of every kind, administrative, executive, and productive, in any particular industry. . . . The State, as trustee for the whole community, by charter (the terms being mutually agreed upon) hands over to this Guild all the plant, material, and assets generally cognate to the industry" (*National Guilds*, p. 298). "The active principle of the Guild is industrial democracy. Herein it differs from State Socialism or Collectivism. In the one case the control comes from without and is essentially bureaucratic; in the other, the Guild manages its own affairs. . . . It rejects State bureaucracy; but on the other hand it rejects Syndicalism because it accepts co-management with the State. . . ." (p. 132).

estimation by the technicians of industry. It may be, however, that force and not reason may decide whether either or neither scheme will survive.

An interesting illustration of the point of view of the Guild propagandist, though it does not reveal the technique of the Guild method, is to be found in Mr. G. D. H. Cole's evidence before the 1919 Coal Industry Commission, from which we may perhaps take the following paragraphs :—

14. In short, from the point of view of the coal consumer and of the community as a whole, the only way of securing efficiency in production—perhaps the only way of securing at all the continuance of the industry—is to *enlist the active co-operation of the workers* by agreeing at once to the assumption by them of a substantial share in control.

15. I shall now attempt to state the case for direct participation in control from the standpoint of the worker himself. Human freedom, where it exists, is not a name, but a living reality. It implies, not the absence of discipline or restraint either by the individual himself or by some group of which he forms, and feels himself to form, a part. A democratic or “ free ” system of government is one in which every individual not only has a share or vote, but also feels that his share or vote is of some effect by virtue of his community with his fellow sharers or fellow voters.

16. This principle of freedom should apply to industrial organization, which forms in a modern community so important and so insistent a part of a man's life. It does not apply under the existing system of conducting industry ; and it cannot be made to apply fully in a day or a year. But it should be our object to apply it as fully as we can, and ever more fully.

17. If, then, a man must receive orders, he must, if he is to be free, feel that these orders come from himself or from some group of which he feels himself to be a part, or from some person whose right to give orders is recognized and sustained by himself and by such a group. This means that free industrial organization must be built on the co-operation, and not merely on the acquiescence of the ordinary man, from the individual and the pit up to the larger units.

18. Only the increasing adoption of this method of industrial organization can give the sense of fair treatment and active co-operation to the workers, and thereby through the removal of unrest and the stimulation of effort, efficient production and service to the consumer and to the community.

The Whitley Reports of the Reconstruction Subcommittee appointed by the Government *open the door* to a gradual solution of our problems, though in themselves they are no remedy for existing evils. They advocate the setting up of industrial councils in which employers and employees can meet and discuss matters of mutual concern, wisely anticipating misunderstanding and localizing ill-feeling. The reports have been favourably received by the greater bulk of public opinion; some sceptical employers and irreconcilable workmen, ever anxious to preserve *class* conflict, still hold back, however, from experiment along the lines suggested.¹

Three types of council are being set up in each industry to give actuality to the Whitley suggestions: (1) The Joint Workshops Committee, the function of which is to secure industrial harmony in the management of the workshop, so that questions of discipline and welfare and minor legislative work for the settlement of grievances fall naturally to it; (2) the Joint District Councils, which will deal with problems affecting the natural industrial areas (e.g. the Clyde or the Tyne shipbuilding areas, or the South Wales or the Staffordshire coalfields); and (3) the National Councils for each industry as a whole. The great advantage of these councils is that they will work without a preconceived theory of what our industrial system ought to be. All engaged on them can, therefore, join forces to hammer out a common policy.

It must be obvious that the success of the Joint Council movement will depend fundamentally on the smooth and effective working of the workshops committees, which will naturally be in closest touch with the problems personally affecting the workers, for grievances must be dealt with at the source. It is through these committees that we shall get eventually a restoration of the *common* interest of all concerned in our social and industrial problems. The dissociated interests of labour and manage-

¹ Trade Unionists in some instances hold that the councils are unduly expensive and absorb too much of the time of officials.

ment can be brought together again and fused into unity only through personal contact between the leaders and the workmen, and this personal contact has ceased to count for much since the advent of the joint stock company, a device which has largely dehumanized our industrial relations. When firms are small, and the principal proprietor is actively engaged in the superintendence of the work being done, it is possible to make those employed feel that they are more than mere cogs in the great wheel of the machine of production,¹ being rather partners in a common enterprise; but where thousands of people are engaged and controlled by the officials of a firm which is itself just a unit in a corporate body, then, if industrial harmony is to be ensured, the establishment of works committees on Whitley lines is imperative. The gain through the Joint Council to the capable employer will be that he will be given the opportunity of proving to the satisfaction of his workmen that he is a captain of industry and an adventurer making for worthy goals, rather than, as he is sometimes depicted, a blood-sucking parasite quite superfluous to our life.

But Whitleyism will only be a complete success if it renders possible the responsible association of the workers in the creative adventure of production. Such association alone will sober the irresponsible, widen the outlook of all engaged, and satisfy the legitimate aspirations of those who find little to satisfy permanently any rational interest in the work which falls to their share in the factory. Otherwise "self-determination in industry," not as it is expressed in the paragraphs which we have quoted from Mr. Cole's evidence before the Coal Commission, but in a more syndicalist form, is accordingly likely to be the battlecry of the labour politicians for the future.

¹ Thus to quote from an engineering journal: "It was possible for Mr. William Armstrong to know personally and to sympathize personally with three or four hundred workmen, but it was quite impossible for Lord Armstrong to know ten thousand workmen, and equally impossible for them to know him."

It must seem, then, that industrial democracy is about to assume form among us as political democracy has already done (though we have by no means completely democratized politics). Yet, just as we have the machinery for expressing the political will of the people even if there is as yet no general political will worth expressing, so the creation of the means for the expression of industrial ideals must precede their effective expression. The industrial will of the people is likely to make itself felt only in the most clumsy fashion for many years to come. But there is also demanded an intelligent and courageous attempt to construct locally such mechanisms of procedure in addition to Whitley Works Committees for the expression of the individual feelings of those concerned in democratized industry that personal friction will be reduced to a minimum. Consequently, there is an urgent need for educating in the widest possible manner the people who are to be responsible for industry in the difficult days before us; the call for men who will be able to display constructive capacity in the organization of production was never more insistent.

The great adventure of large-scale industry, with its countless processes of almost miraculous ingenuity and its wide range of possibilities yet unexplored, must still be carried on with as much enthusiasm as ever, but it must be carried on by an army of intelligent workers with a high *morale* and a capacity for insight and invention. Industry has always been one of the chief instruments of culture and civilization, and will continue to be indispensable to our continued development. But while the stream of life is still flowing strongly in the centre, there is a dead weight of inert humanity gradually accumulating at the sides which must be borne along with it. In all the great cities of the world there is being produced a distinctly low-grade type of worker fit for little else but routine occupations. Far too many of our people to-day are living mechanical lives on the big slag heaps which we call our centres of industry, cut off from culture in

every form, the dulness of their existence broken occasionally only by bursts of pathological excitement. In addition, therefore, to increasing opportunities for self-government in industry we must provide for the possibility of self-development for all through a national system of adolescent and adult education. We may then begin to speak of industry as a *democracy organized for public service*.

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§ 8. INDUSTRIAL EDUCATION

In our attempt to make the men and women of to-morrow fit for industrial democracy we must provide the education which on the one hand will enable the boys and girls of the nation to free themselves from exploitation and equip themselves for expert service in a definite vocation, and on the other supply the specialized training which will be necessary for those who will be called upon to assume responsible control of the industrial machine. At the present moment we are prepared for undertaking neither of these difficult tasks.

Our industrial leaders have not yet given serious thought to the efficient recruitment of the ranks either of the workers or of the technicians. For example, in the mediæval guilds the boy who wished to learn a craft found an enthusiastic circle of teachers intent upon helping him to become an efficient workman or merchant ; in the modern factory he finds in most cases no personal interest at all displayed in his ambitions, but only the desire to exploit to the full what natural aptitude he possesses and leave him when grown to manhood with nothing but a low order of routine skill as his best instrument for gaining a livelihood.

The pressure of the untoward events of recent years has, moreover, forced us to a consideration of the problems of industrial training. The Ministry of Labour¹ has issued during the past few years a series of reports upon what is being done and left undone in this matter. From a reading of these we shall gather how premature and

¹ See, e.g., *Ministry of Labour, J.E.C.* 13.

platitudinous it is to talk about a race of educated workers eager for the advancement of technology and civilization. A Government investigation of the conditions under which roughly one hundred thousand boys were being employed by nine hundred firms revealed the fact that only about one-third of these boys were being treated by their employers as having a right to definite training as a preparation for earning their livelihood, while nearly 10 per cent. were employed under conditions which in time would render them unfit for responsible citizenship and make their subsequent permanent inefficiency or vagabondage inevitable. Yet we must provide a continuous supply of men and women of skill, enterprise and intelligence if we are to sustain industry at a high level of achievement ; so that to condemn, through lack of adequate training, the majority of our people to unvaried repetition work and to neglect thereafter the culture of their rational interests, is to be guilty of the positive act of ensuring national degeneration of both body and mind.

It is a duty upon which we ought to insist that in proportion as the work in any business or workshop becomes mechanical, there should be provided, in the interests of the individual workers and every one else concerned, such means as will enable the wits dulled by routine to be sharpened and the sleeping spirit awakened. Gilbreth, it will be remembered, instituted a Reading Box system in his works by which he secured marked alertness of mind among his employees. Welfare workers, works committees, and managers will be called on in the future to concentrate on the problems not only of aiding speedily a recovery from fatigue, but also upon the closely related task of preserving among the workers an open outlook and a vivacity and keenness of interest in all the progressive developments of industry.

At the basis of all interest in invention is the powerful human instinctive tendency to curiosity, which we have refrained from mentioning till now. This natural impulse, which is so strong in young children and in the higher

animals—rabbits and other *poorly endowed* or *timid, defenceless* creatures alone lack it to any extent—seems in modern life either to atrophy or else assume a pathological form among the mass of our people. At all costs natural curiosity must be developed and refined, since it is the manifestation of the human spirit in one of its most promising forms. It is an important function of education to stimulate a rational curiosity, but education for 90 per cent. of our children has up till to-day ceased at the age of fourteen, and the heroic few who have attended the continuation schools in the past have been too tired after their day's labour to learn, as their teachers have been too tired to teach.

Happily, with the prospect of the coming into operation of the new Education Act for the compulsory day training of youths up to the age of eighteen there is occasion for hope. The only difficulty we foresee will be that of keeping steadily in view in the organization of continuation schools the double aim and ideal of an education which will supply both technical skill and general culture. Provision is made in the Act for boys and girls to attend schools inside the works at which they are employed, and for education committees to conduct schools outside. At the moment the works school is looked upon with suspicion by organized labour, because it is assumed that its main purpose must always be to turn out routine workers fit for one or two semi-skilled tasks, but deficient in general intelligence and character ; while the outside school, owing to the influence of labour leaders and "reformers" who have little or no sympathy with vocational training, threatens to be conducted upon lines which will be much too general. Though each type has its legitimate sphere, their respective aims, unless harmonized each with the other, will prove largely sterile. The Labour Party's Advisory Committee which studied the general question reported that "works schools ought not to be recognized," and that "many employers will aim at using their control of the schools to turn a continued education into a narrow and special-

ized training for the branch of industry in which they are interested." Sceptical employers, on the other hand, see little that promises to be concretely useful in the establishment of schools for the *general* education of their workers. Yet it should not be difficult for the new Whitley Works Committees to keep a watchful eye upon the works school ; while it is certain that schools which are too divorced in interest from industry will be forced to reform themselves if they are to retain their vitality, for growing youth will only take spontaneously to the type of education which it sees to be intimately connected with its vocational ambitions. Considerable opportunities for self-determination and self-government will also be necessary. Adolescent education should, then, give us both good citizens and skilled workers.

In connection with the vocational training of youth we shall probably see in all large works the appointment of apprentice masters charged with the duty of supervising the workshop training and education of the young people employed. There is an urgent need of the rare type of man who understands the needs of industry as well as those of individuals. Such a man will assist the boys under him to develop those all-round qualities of character and ability on which their capacity to succeed ultimately in positions of responsibility so much depends. From the reports of work done in properly arranged courses of study and under responsible technical instructors he will derive much useful knowledge, which he can apply with benefit to all concerned. Part of his practical service to management will lie in his power to advise in the selection of the right men for specific posts which fall vacant.

There is, indeed, room for a new type of apprenticeship according to the terms of which the boy or girl engages to give his or her services in return for education and training and an agreed salary, the understanding being that it shall be left to the apprentice master and the apprentice to map out between them the career which the abilities of the latter and the possibilities of the industry

—and these will be extraordinarily varied in a large factory or workshop—will together determine. Under the old apprenticeship system the boy could learn with fair speed a single trade ; under the new system there need be no limit to the skill and knowledge which may be acquired. In view of the tendency of present-day firms to pay reasonable salaries to apprentices there should no longer be a disinclination on the part of parents to make some financial sacrifice in order to aid their children to gain the best skill and knowledge humanly possible. Often the apprentice master will discover that a youth will be best trained for the mastery of one definite trade, but sometimes he will decide that the experience of a variety of trades is advisable as a preliminary to the appointment to a post of responsibility.

Whatever may be thought of the practicability of continued education or apprenticeship, we may be tolerably sure that they will form the best offensive which we can take up against hooliganism, and at the same time the only serviceable stimulus for the low-grade worker. With the gradual decrease in the number of hours worked daily the problem of the economical and inspirational use of leisure will become increasingly important. The deficiency of most of our smaller factory towns in recreational facilities is deplorable. Nothing but street-promenading, pub-lounging, or “ picture ”-absorption seem to be open to the majority of adolescents during two-thirds of the year. It should be considered a disgrace to any municipality that it is backward in providing educational entertainment in public halls, libraries, museums, concert halls, picture galleries, parks, swimming-baths and social institutes, or in attempting to create a public demand for their use.

At the other extreme of the scale of organized industry we find the works manager and the technical expert. These two types of worker will need in the future an increasingly severe discipline and training to fit them for the fast-developing complexity of their tasks. Just as the tools

and processes of our fathers became inadequate as enterprises grew in magnitude, so the simple administrative methods formerly in use have long since become obsolete. The demand for highly trained men of initiative and sagacity will proceed at the same pace as the mechanization of methods and processes. Recently Lord Alderley declared that the underground railway adventure would be calling, and not with sure hope of success, for men who could earn £10,000 a year as organizers. This illustration gives force to our point.

Obviously the man who is equipped for dealing effectively in a tactful and enterprising manner with problems involving not only the interests of his employers but also those of the community, the trade unions, his rivals, and the state officials will have acquired his skill only after a strenuous course of the most varied experience and concentrated training. In the academic sphere there has been heard from all sides lately a cry for the opening up of an educational highway to all from the primary schools to the university ; the justification for the cry being that all boys and girls who have the aptitude should be enabled to take advantage of all the possibilities of culture open to them. Do we not need a highway in the world of industry along which our children may pass as far as their abilities and character will take them? The responsibilities of industrial leaders are now so great that we must look for recruits to succeed them wherever ability which is not the exclusive possession of any class can be found.

While our attention is being centred upon the problems of training the apprentices and the experts, the average worker must not be left to fate. He, too, must be given opportunities for advancement. Gilbreth established the "three position" plan of promotion to stimulate his workers. This plan ensures that every workman has three functions which he performs more or less simultaneously. As a worker he is interested in the process which he is controlling, but he is also, if he wishes to be, interested

in another process of a more difficult kind for the performance of which he is qualifying under an efficient teacher who is already employed on it, while he himself acts as a teacher of the man who will follow him and do his work when he passes on to the new process. Thus every process implicates three men, and every man is interested in three processes. Such a plan is an excellent example of the kind of mechanism which we indicated on page 177 as being desirable.

We have spoken of the advance on Taylorism which has been made by the younger efficiency engineers. At this point we may perhaps quote an illustration of the outlook of the neo-Taylorist who sees how much more effective it is to treat the worker as a rational being naturally curious instead of as a creature motivated mechanically by self-interest. Mr. Robert Wolf, in a paper read before the Taylor Society in March, 1917, described how he increased the efficiency of a paper-manufacturing process by an appeal to the rational interest and curiosity of his workmen.

He found that it was necessary at a certain stage of manufacture to leave on a low pressure for three minutes in order to extract the maximum amount of moisture from the paper pulp.

As long as the foremen kept constantly after their men (he said),¹ and vigilantly followed them up, we obtained some slight increase in the test, but it required a constant urging upon our part to focus the attention of the men upon this three minute time of low pressure. We finally realized that in order to get the results we were after it was necessary for us to produce a *desire* upon the part of the men to do this work in the proper way."

Mr. Wolf then tells us how by an appeal to the human tendency to rivalry, enforced through posting up in a conspicuous place the weekly order of efficiency among the men, he secured an improvement of from 42 to 60 per cent. Then he tried the simple expedient of explaining

¹ *Bulletin of the Taylor Society*, March, 1917.

in detail the technique of the process, what the machine meant, how efficiency was obtained, and by putting the recording instruments where the men themselves could inspect them. "*As a result of this our efficiency rose from 60 per cent. to 80 per cent. in less than four weeks, and has remained at 80 per cent. ever since.*"

REFERENCES

An exhaustive bibliography of the education of adolescents is to be found in *Boy Life and Labour*: ARNOLD FREEMAN.

CHAPTER VIII

CONCLUSION

IN every society and in every age when it happens that the many-sided life of a people is being developed in organic harmony, nourished and enriched through its attachments to what is vital in the traditions and culture of its past, and serenely confident of its ability to exploit for human use the emergencies of its future, science and industry are to be seen working together in effective unity. But when civilization and culture begin to decay, the currents of life and of learning fall gradually apart and take diverse directions: learning becomes sterile, being almost wholly abstracted from regenerating concrete reality, while life frequently becomes blind to the inevitableness of a disaster which it lacks the foresight to avoid.

In the present critical epoch of world-construction, therefore, nothing is more imperatively urgent than that our leaders and teachers in every sphere of influence should emphasize the importance, and emphasize it repeatedly, of a wholehearted working partnership and sympathy between well-grounded knowledge and vigorous practice. Each is supremely capable of vitalizing and revitalizing the spirit of the other.

It is when, for example, the engineer, the gardener, and the doctor are able to generalize soundly from the rich accumulation of their practical experience, and so connect it up with the master principles of organized science, and the artist, the scholar and the teacher are

able to test frequently the validity and the practicability of their theories and principles by coming sharply into contact with everyday life, that we have the ripest conditions of a healthy social growth and the consequent possibility of a happy cross-fertilization, destined to bear the richest fruit, between action and thought.

Here in England there is fortunately little fear of learning becoming merely academic, or of industry and commerce growing short-sighted, yet frequently it will be worth while to point out the obvious truth that study divorced from practice may make a man or woman learned in his or her occupation, but never remarkable either for wise common sense or unusual practical insight ; while an exclusively practical training may make a worker skilful, but it will usually produce nothing but skill of a routine kind incapable of originality or inventiveness, or indeed of any rational understanding of the scientific principles on which it is based.

But from the union of theory and practice, of learning and skill, of science and industry—and from this source alone—we shall obtain the proper explosive mixture for the engines of civilization and progress. Or, to put it differently, science, like the phoenix of old, cannot for ever remain aloft in the immortal heavens and preserve unimpaired her mighty energies ; she must sometimes descend into the fires of industry to be re-born and re-energized for the renewal of her enterprising flights into ever fresh spheres of invention. And the industrial commonwealth cannot be nourished on bread alone.

John Stuart Mill tells us of a Scotch manufacturer who procured from England, at a high rate of wages, a working dyer famous for producing fine colours almost beyond imitation. This manufacturer wished his own workmen to be taught to acquire the same skill.

“ The foreman came, but his mode of proportioning the ingredients—in which lay the secret of the effects he produced—was by taking them up in handfuls, while the common method was to weigh them. The manufac-

turer sought to make him turn his handling system into an equivalent weighing system, that the general principle of his peculiar mode of proceeding might be ascertained. This, however, the man found himself quite unable to do, and therefore could impart his skill to nobody, as he had never generalized the grounds on which he acted in his own mind, nor expressed them in language."

In short, his skill in comparison with that of the trained engineer, craftsman or artist was, after all, of a narrow common-place routine type, in spite of the unique excellence of its development.

Now, while it may truly be said to-day that in many important particulars we have transcended such rule-of-thumb skill in our methods of industrial organization, it will hardly be denied by the majority of observers that in most fields of effort—in the work of the individual labourer at the bench, of the machine operator in the factory, of the clerk in the office, of the works manager in the control of his department, of the employer in the organization of his business, and of the statesman responsible for the good government of a nation—there is still an unduly great amount of what cannot be called by any more laudable name than mere rule-of-thumb routine skill, of exactly the same type as that displayed by John Stuart Mill's working dyer (yet seldom so wonderfully developed), a type of skill dependent for its quality on sheer length of experience.

In the invention of machines and "labour-saving" devices we have made notable progress; in the reconstruction of industry as an agent for increasing human skill and well-being we have no more than begun our apprentice period of learning. As Professor Patrick Geddes has so strikingly said :—

Our industrial age in its beginnings, and indeed too long in its continuance, turned upon getting up coal almost anyhow, to run machines almost anyhow, to produce cheap products, to maintain too cheap people almost anyhow—and these to get up more coal,

more steam, more machinery, and more people, still almost anyhow, and to call the result "progress of wealth and population." Such swift multiplication of the quantity of life, with corresponding swift exhaustion of the material resources on which this life depends, has been too much—as our coal economists now and then sternly remind us—like that of the mould upon a jam-pot, which spreads marvellously for a season, until there is at length a crowded and matted crust of fungus-city full of thirsty life and laden with innumerable spores, but no jam left.

The past one hundred and fifty years of industrial effort was a period during which all but a few of our manufacturers and business men seemed to be without any steady synoptic view of the probable effects of the complex forces which were operating among and around them. It is to-day only that the vision of an ordered and progressive community in harmony with its own most enlightened activities is being satisfactorily focused; to-day only are we beginning to realize, for example, that the shining Utopias of those great dreamers who have either been out of sympathy with the movements of contemporary industrial life, or else never contemplated their possibility, are destined to remain unfulfilled for ever.

Modern large-scale industry, which many such Utopias were planned to obviate, is no social malady, as sentimentalists are often tempted to believe, but an essential organ of our civilization which it is our duty to sustain in fullest working efficiency. Nevertheless, if no *Utopia*, then a *EUtopia* may one day arrive, positively if gradually, provided we go forward with patience and courage, quick to seize at the ripe moment the maturing fruits of present experience, but slow to part with the well-proved treasures of the past.¹

The present vibrates with hope. Almost daily we

¹ Mr. Belloc has recently reminded us in this connection that nations and individuals throughout history have hardly ever appreciated their opportunities till it was too late to use them fully. In the late war, for example, what tremendous differences might have been made if the Allies or their enemies "had only known" this or that.

hear of the new spirit in industry, not yet fully incarnate, it is true, yet vigorously alive nevertheless. It would indeed seem that, with skilled judgment and co-operative goodwill, the currents of universal endeavour which long enough have been running divergently—the endeavour of the engineer to increase output and cheapen cost, of the worker to improve his material well-being and status, and of the social reformer and the statesman to establish firmly the foundation of the Eutopia to be—may haply be guided at no distant date into a single channel of movement.

To ensure this consummation of our ideal hope, the scientific management about which we have heard so much in the last decade must be made scientific in the fullest sense, so that it will embrace a sound knowledge, not only of the machinery of production and distribution, but also of the best methods of organizing beneficently the natural impulses and energies of the workers, and of the most effective means, too, of stimulating and withal satisfying the deepest needs of us all. Moreover, both the articulate and the inarticulate just aspirations of our newly awakened democracy must be patiently cultivated, yet kept within wise control till the workers in every branch of industry have everywhere learnt something of the extent, significance and responsibility of the tasks which confront the technician, the works manager and the administrator.

It already seems to many observers that we are fast moving towards that perfection of the *machinery* of production and distribution which will be fundamental to the structure of our coming Utopia ; but who will dare suggest that, even in the most imperfect measure, we have yet learnt to organize as interdependent factors in the various trades and industries the vital activities of the workers ?

While, to great numbers still, does not the idea of a day when world-wide industry and the willing service of humanity will signify the same thing, when every

occupation will be the basis of an honourable vocation—so that all our work will allow for genuine creative self-expression—seem suggestive merely of a vain fluttering of the wings of desire about the barred portals of a heaven utterly beyond our leaden human reach?

Happily the problems which are here hinted at are being faced in a resolute manner to-day by the younger generation of efficiency engineers and works managers who have passed through their apprenticeship to *Taylorism* and are now taking up a stronger position beyond it. These neo-Taylorists have, indeed, discovered that, while exclusive attention to the perfection of the mechanics of industry will often produce better material goods in ever-increasing quantities, it will not necessarily of itself produce either better bodies or better brains among the producing classes.

Thus Mr. A. P. M. Fleming, one of our keenest industrial thinkers, said recently that that which is ethically right is now seen to be economically desirable, and that “if we can seize the opportunity that is now presented . . . a measure of life and well-being will be assured to the community which it has never previously known.”

Much depends on the skill of such men, for they have caught glimpses of the profound truth that somehow beyond our present finite comprehension, the conditions of a perfected system of production and distribution, of a perfected organization of human energy, and of a perfected humanity itself, are indissolubly bound up together. It is out of a vital faith in this truth that the new spirit in industry has sprung into being.

INDEX

- Ability—
 - calculating, 92-93
 - language, 93-96
- Abnormality, 139-140
- Accidents, 37-39, 44-46
- Adaptability, 118-120, 199
- Adrenin, 37
- Alcoholism, 203
- Aptitudes, vocational, 71-97
- Arbitration, industrial, 146
- Assembling, machine-, 54-55
- Atmospheric conditions, 35
- Attitude, mental, 42-43

- Bonuses, 105-109
- Bricklaying, 50-53
- Building guild, 212-213
- Bureaucracy, 216

- Ca' canny, 134, 139
- Calculating ability, 92-93
- Cinema, 201-202
- City life, 161-163
- Class consciousness, 137, 182
- Combination laws, 143, 170-171
- Conflict, industrial, 142, 146
- Construction of mental tests, 83-97
- Conversation, 164
- Co-operation, industrial, 219-224
- Co-partnership, 118, 210-214
- Craftsmanship, 191-197
- Curiosity, 231-232

- Dexterity, 91-92
- Direct action, 139

- Disease, occupational, 34
- Disharmony, 142, 146

- Education, 135-136, 225-232
- Ergograph, 31-32

- Fatigue, 21-48
 - elimination of, 50-60
- Fear, 157
- Foreman, 112-114
- Functional management, 111

- Gambling, 203
- Gregariousness, 160
- Group activities, 165
- Group-mind, 138-139
- Guild socialism, 219-220

- Ideals, industrial, 198, 206-209
- Incentives, 153
- Industrial revolution, 170
- Inferiority complex, 148-150
- Innervation, 124
- Instincts, 174-186
- Instruction cards, 110
- Integration, 145
- Intelligence, 76-97
- Interest and ability, 74-75

- Labour—
 - attitude, 128-140
 - solidarity, 129
 - turnover, 120-121
- Language ability, 93-96
- Legislation, 34
- Length of working day, 28-29

240 PSYCHOLOGICAL PROBLEMS OF INDUSTRY

- Lighting, 39, 56
- Lightning strikes, 218
- Mechanization of labour, 103-104
- Mental *tempo*, 78-80, 122
- Monotony, 117-127
- Morale*, 41-43
- Motion study, 61-66
- Mutual aid, 155
- Noise, 35-36
- Organisms and societies, 137
- Outings, 204
- Overtime, 30-31
- Ownership, 144, 177-181
- Parliament, 170
- Paternalism, 130-131
- Physique, national, 194
- Piece-rates, 105
- Play, 197 *et seq.*
- Promotion scheme, 230-231
- Psychography, 90
- Psychology, 11-17
- Reactions, defence, 203-204
- Reading boxes, 58
- Recreation, 200 *et seq.*
- Regression, 175-176
- Repetition work, 115-127, 193-196
- Rest pauses, 25-28, 43-44
- Rivalry, 176-177
- Route-ing, 17, 110-111
- Sabotage, 186
- Safety first, 45-46
- Scientific management, 102 *et seq.*
- Sectionalism, 217-218
- Self-assertion, 181-182
- Self-consciousness, 181
- Self-interest, 154-155
- Solidarity, 166
- Speed and monotony, 121-122
- Springs of conduct, 153 *et seq.*
- State socialism, 215-216
- Strike ballots, 167
- Submissiveness, 183-188
- Suspicion, 132-133
- Syndicalism, 180, 217-218
- Tactful innovations, 134
- Temperature, 35
- Tempo*, mental, 78-80, 122
- Tests, vocational, 76-97
- Tools, 57
- Trade unions, 168-173
- Unemployment, 108
- Unrest, industrial, 137 *et seq.*
- Variability, organic, 33
- Vocational aptitudes, 67-97
- Wage systems, 105-109
- Welfare work, 59-60
- Whitley Councils, 219-222
- Woman worker, 187-190
- Work curves, 24
- Works schools, 227-228

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